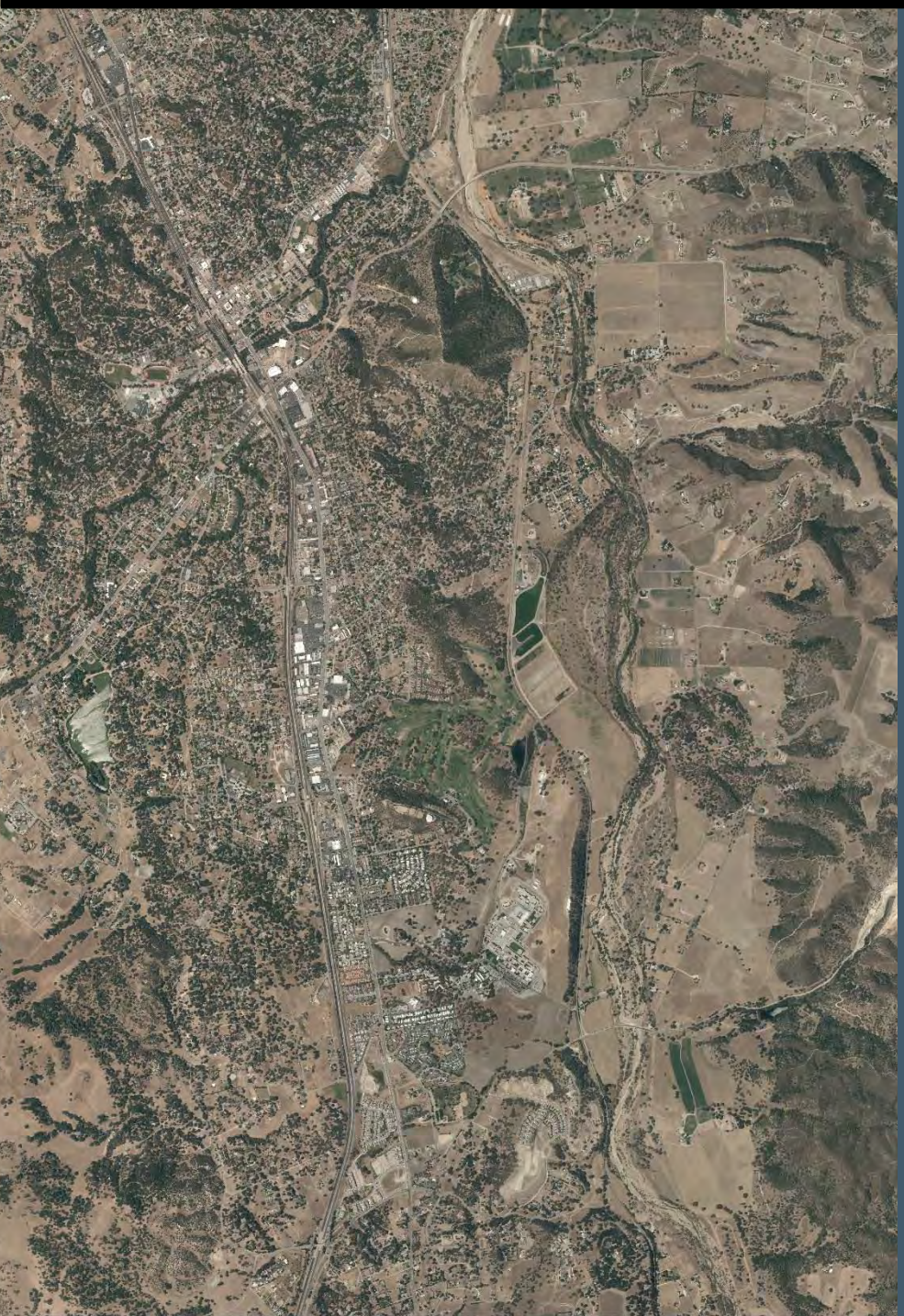
Final - October 2015

City of Atascadero Wastewater Collection System Master Plan Update



Condition and Capacity Assessment and Recommended Improvements

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City of Atascadero

Final Wastewater Collection System Master Plan Update, 2015

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List of Acronyms

AC	Asbestos Cement
ADD	Average Day Demand
ADF	Average Daily Flow
ADWF	Average Dry Weather Flow
AWWF	Average Wet Weather Flow
CCTV	Closed Circuit Television
CIP	Capital Improvement Plan
DIP	Ductile Iron Pipe
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GPDU	Gallons per Dwelling Unit
GPM	Gallons per Minute
I/I	Infiltration and Inflow
MDD	Maximum Day Demand
MFR	Multi-Family Residential
MGD	Million Gallons per Day
MKN	Michael K. Nunley & Associates, Inc
MMF	Maximum Month Flow
MNS	MNS Engineers, Inc.
PDDWF	Peak Day Dry Weather Flow
PDWWF	Peak Day Wet Weather Flow
PDF	Peak Daily Flow
PHD	Peak Hour Demand
PHDWF	Peak Hour Dry Weather Flow
PHF	Peak Hour Flow
PHWWF	Peak Hour Wet Weather Flow
PVC	Polyvinyl Chloride
RWQCB	Regional Water Quality Control Board

SFR	Single-family Residential
VCP	Vitrified Clay Pipe
WCSA	Wastewater Collection Service Area
WWTF	Wastewater Treatment Facility

Executive Summary

This Wastewater Collection System Master Plan Update and Wastewater Treatment Facility Master Plan Update have been prepared separately but are intended to be compatible planning tools for use by the City of Atascadero (City) in developing a comprehensive Capital Improvement Program for both the collection system and treatment facility.

Land Use and Population

The population within the current City limits is approximately 28,814, based on 2012 data from the United States Census Bureau. The City's General Plan 2025 population projection is estimated at 36,030. The City does not provide wastewater services to the entire City population. The existing wastewater service area include 1,926 acres of developed land.

An additional 773 acres of land within the wastewater service area is anticipated to be developed in the future. This includes 957 approved residential units and 677,671 square feet of approved commercial development. An additional 52.6 acres of land identified by the City's Community Development Department were also evaluated and those parcels are included in the future wastewater projections.

The proposed Eagle Ranch Development, which may connect to the wastewater system, includes an additional 193 residential units and 20,400 square feet of commercial space.

Collection System Overview

Based on the wastewater GIS update as part of this project, the gravity sewer collection system consists of more than 63 miles of mains and trunk lines with sizes ranging from 4 to 21 inches. Gravity pipeline materials include polyvinyl chloride (PVC), vitrified clay pipe (VCP), asbestos cement (AC), and ductile iron pipe (DIP).

The City currently owns and operates twelve lift stations, which convey wastewater through a total of more than 6.8 miles of sewer forcemains, ranging in size from 4 to 16 inches in diameter.

Wastewater Flows

The average day flow based on measured plant influent was estimated as 1.3 million gallons per day (MGD).

For this Wastewater Collection System Master Plan Update, four flow meters were installed in key locations throughout the City's collection system to collect peak hour dry weather and wet weather flow data. The results were used to determine peaking factors for peak hour flow rates. The resulting peak hour wastewater flow peaking factor was calculated to be 3.80. This peak hour factor was used in the hydraulic model. The existing peak hour flow rate is estimated to be 5.24 MGD.

For future conditions, based on projected land use and population, additional average day flow of approximately 371,000 gallons per day (GPD) was calculated. This results in a future average day flow (ADF) of 1,750,000 GPD and a peak hour flow of 6.65 MGD.

If constructed and connected to the collection system, the Eagle Ranch Development is anticipated to contribute additional flow of approximately 220,000 GPD.

Inflow and Infiltration

Inflow and Infiltration (I/I) consists of stormwater entering the collection system as a result of a specific rainfall event, as well as groundwater infiltration. I/I is an important flow component because it typically determines the peak flow rate used for proper sewer size and maximum treatment capacity.

For this analysis, measurement of overall system I/I was conducted. Daily flows were examined from January 1, 2008, through December 31, 2013. During this period, average dry weather flow was 1.23 MGD. The peak daily flow (PDF) was 3.01 MGD, which occurred on March 20, 2011, and correlated with a high rainfall event. This indicates flows

contributed to the system due to I/I increased the daily flow to the WWTF by 145% over average long term ADF, or 1,780,000 gallons on March 20, 2011.

MNS recommends the City implement additional flow monitoring during wet weather to isolate regions in the collection system where levels of I/I are highest. Once these areas are identified, the City may implement an additional round of wet weather flow monitoring to identify areas where I/I is the highest. A specific program to address this inflow should be implemented once the source of I/I has been identified.

Lift Station Evaluation

The City currently owns and operates twelve lift stations. A condition assessment of each lift station was conducted and general observations are included in Section 6.1. Specific observations applying to each lift station are included in Appendix D.

An analysis was conducted to estimate the minimum time, in the event of a system failure, until a wastewater spill occurred at each lift station. Based on this analysis, the City should consider the need for back-up electrical generation at Lift Station No. 13.

Major projects at three of the City's lift stations were evaluated as part of this study as described in the following subsections.

Lift Station No. 2

The City is considering abandoning Lift Station No. 2 and converting the contributing area to flow by gravity. The hydraulic model indicates the majority of the pipe segments downstream of Lift Station No. 2 would become hydraulically deficient if this conversion were to occur. The pipe segments found to be hydraulically deficient are shown graphically and labeled in Appendix F. Based on the anticipated costs to upsize piping downstream of the Lift Station No. 2 abandonment, MNS recommends the lift station be replaced, rather than abandoned.

Lift Station No. 5

Lift Station No. 5 is in relatively poor condition; the City is considering alternative strategies to optimize the operation of the lift station and to reduce the risk of wastewater spills. In 2006, the City conducted a preliminary analysis of several options for modifying Lift Station No. 5 (Cannon, 2008). An update to this study was conducted in 2015 (MKN & Associates, 2015). The preliminary analysis concluded the City should proceed with a preliminary design to rehabilitate or replace Lift Station 5 in the current location. A detailed description of the proposed improvements can be found in Section 7.9.

Lift Station No. 13

The City is considering modifying discharge piping and the forcemain for Lift Station No. 13 to reduce odors and reduce the required discharge pressure at the lift station. These modifications would also increase the pumping capacity of this lift station utilizing the existing pumps. The proposed modification would abandon the final 1,600 linear feet of the existing 6-inch diameter forcemain and extend the forcemain along an alternate 2,700 linear foot route with 8-inch piping. Enlarging the discharge piping at the lift station would also be included in the project.

A pump and system curve modeling result for the proposed future condition is included in Appendix H. MNS recommends these improvements be implemented to increase the capacity of the lift station to meet future flow requirements.

Lift Station Hydraulic Deficiencies

A Hydraulic analysis was conducted on each of the twelve lift stations. The hydraulic deficiencies and the recommended improvements are shown in **Table ES1**.

Table ES-1: Lift Station Hydraulic Deficiencies		
Lift Station No.	**Hydraulic Deficiencies**	**Recommendations**
1	The wet well is oversized (less than 1 cycle per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues.	Modify pump set points to reduce pump cycle time, and reduce sewage age in the system. Replace pumps with lower capacity pumps to relieve downstream capacity issues.
2	The pumps are oversized for the current hydraulic conditions, and are operating near the end of the pump curve.	Install new pumps sized to meet hydraulic conditions of the new lift station.
4	The wet well is oversized (less than 1 cycle per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues.	Modify pump set points to reduce pump cycle time, and reduce sewage age in the system.
5	The lift station has insufficient pump capacity in the future condition to handle peak flows without operating the lag pump.	As part of the Capital Improvement Project to replace/reconstruct Lift Station No. 5 and construct a new lift station, peak future flows should be taken into account in the design.
6	The lift station has insufficient pump capacity in the future condition to handle peak flows without spilling.	Replace the pumps at the lift station with higher capacity submersible pumps.
11	The wet well is oversized (less than 1 cycle per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues.	Modify pump set points to reduce pump cycle time, and reduce sewage age in the system.
13	The lift station has insufficient pump capacity in the existing condition to handle peak flows without spilling.	Increase the discharge piping at the lift station from 3” to 6”, and implement the proposed improvements described in Section 7.10.

Collection System Analysis

A hydraulic model was developed to analyze the hydraulic functionality of the wastewater collection system. Flows were developed by MKN, based on dry weather flow monitoring from July 2, 2013 to August 7, 2013, and historical flow data. A detailed discussion of the development of the model inputs is included in Section 4. A peaking factor of 3.80 was used to model the peak hour flow. The results of the hydraulic model for the existing wastewater collection system yielded a peak influent flow to the wastewater treatment facility of 3,825 GPM, or 5.50 MGD, including pumped flow.

The hydraulic model was used to determine where the gravity collection system is hydraulically deficient during existing and future peak hour flow rates. The pipe segments found to be hydraulically deficient are shown graphically and labeled in Appendix F.

Capital Improvement Projects

A series of capital improvement projects have been developed to upgrade the wastewater collection system to meet existing and future flow requirements, to reduce operation and maintenance expense, and to preserve the City’s investment in the collection system infrastructure. Each capital improvement project was assigned a priority of 1, 2, or 3, corresponding to how rapidly the City should implement the capital improvement recommendations, with Priority 1 Projects having the highest priority. A map showing the locations of each project is included as Appendix I.

A summary of the anticipated budgetary costs associated with the recommended capital improvement projects is included in Table ES-2.

Table ES-2: Collection System Capital Improvement Summary	
Capital Improvements for Existing Lift Station Deficiencies	$8,507,000
Capital Improvements for Future Lift Station Deficiencies	$64,000
Capital Improvements for Gravity Collection System Deficiencies	$4,095,000
Total	**$12,666,000**
Total Priority 1 Budget	$3,161,000
Total Priority 2 Budget	$9,350,000
Total Priority 3 Budget	$155,000
Total	**$12,666,000**

The City should incorporate the capital improvement projects in their budgeting process and future rate studies to ensure adequate funds are available to complete these projects. In addition, the City should immediately begin the planning phases for Priority 1 capital improvement projects, such that construction can commence as soon as funds are available.

In addition, as with any major infrastructure system, ongoing work is required to maintain the collection system to sufficient working condition. The City should establish a wastewater collection system repair and replacement reserve to set aside funds for these ongoing needs.

Staffing Evaluation

The goal of the staffing evaluation was to compare operation staffing levels of other local, similarly-sized wastewater agencies to determine appropriate staffing levels for the City of Atascadero's wastewater operations. Based on this analysis, the City's wastewater operation staff should include 8.4 FTE (full-time equivalent) staff members, in other words, 8 full-time operators, and one part-time operator to be adequately staffed. The City currently has 6 operators on staff, of which one is the operations manager. The City should add two additional full time operations staff, and one part time operations staff to reach adequate staffing levels.

In addition, the City should consider establishing collection system supervisor and a treatment system supervisor positions. These positions would be included in the total of 8.4 FTE staff members. This would help distribute managerial effort among multiple staff.

SECTION 1 Introduction

This Wastewater Collection System Master Plan Update and Wastewater Treatment Facility Master Plan Update are being prepared separately but are intended to be compatible planning tools for use by the City of Atascadero (City) in developing a comprehensive Capital Improvement Program for both the collection system and treatment facility.

This introductory section provides background information on the purpose and organization of this Wastewater Collection System Master Plan Update and provides a brief overview of the City's service area and sewer system.

1.1 Overview

The City is located in San Luis Obispo County and is surrounded by the cities of Paso Robles and the communities of Templeton and Creston. The City has a population of over 26,000. Approximately 11,000 parcels and (15,000 acres) are located within the City limits. Currently wastewater service is limited to approximately 5,000 parcels covering an estimated 1,900 acres, including a majority of the businesses within the City limits. Land uses served by the City's sewer system include residential, retail, office, commercial and light industrial developments. Privately owned and maintained on-site septic systems are utilized by the remainder of the City. Figure 1-1 shows the tributary areas served by the wastewater collection system, and a schematic of pumped flows in the collection system.

The sewer collection system consists of, 12 active lift stations, approximately 6.8 miles of forcemains, and more than 63 miles of gravity sewer mains and trunk lines ranging in size from 4 to 21 inches in diameter. A series of gravity collection system mains and lift stations convey most of the wastewater flow from the northern portion of the system to Lift Station 5. Flow from the southern portion of the system drains to Lift Station 3. Lift Stations 3 and 5 pump directly to the City-owned wastewater treatment facility.

The purpose of the Wastewater Collection System Master Plan Update is to provide the City with a detailed evaluation of the collection system and lift stations, and to enhance the tools used for managing the system.

The goals of this Collection System Wastewater Master Plan Update are:

1. Update existing GIS based on the City's most current collection system information.
2. Evaluate existing peak wastewater flows and coordinate with City planning staff to estimate potential future flows as a result of General Plan implementation.
3. Update and evaluate the hydraulic model of the City's wastewater collection system including all lift stations.
4. Identify existing and future system hydraulic deficiencies.
5. Complete a detailed condition assessment of the City's 12 lift stations.
6. Review and consolidate the known condition issues within the collection system.
7. Develop capital improvement projects to address existing and future hydraulic and condition deficiencies.
8. Provide and prioritize a capital improvement program, including budgetary cost estimates for each of the proposed projects.
9. Evaluate the adequacy of current staffing levels and provide recommendations.
10. Develop recommendations for a repair and replacement program to build a budget reserve to address aging system components in the future.

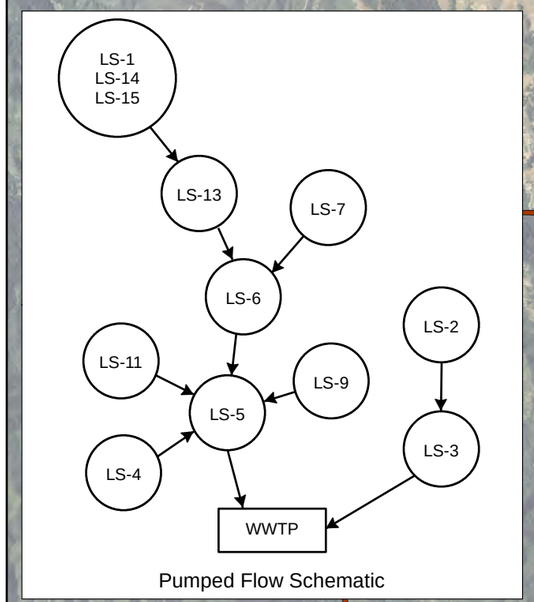
Wastewater Collection System Master Plan Update

Figure 1-1: Lift Station Tributary Basins

Legend

- LS — Lift Station
- WW — WWTP
- Forcemain
- Gravity Sewer
- LS-1
- LS-2
- LS-3
- LS-4
- LS-5
- LS-6
- LS-7
- LS-9
- LS-11
- LS-13
- LS-14
- LS-15
- City Limits

Scale: NTS



Pumped Flow Schematic

1.2 Scope

To achieve the goals of this study, the scope of work and the report were organized by the following elements.

1.2.1 GIS System Update

A key objective of this master plan was to update and enhance the City's GIS layers related to the wastewater collection system. The update enhanced the existing system by repairing identified flaws, updating asset coordinates, adding new infrastructure to the system, and revising the wastewater collection system atlas. The revised GIS system was used as the basis for the collection system hydraulic analysis.

1.2.2 Land Use and Population

An evaluation of the current and future land use and population was conducted. The planning horizon is consistent with the City's current General Plan through the year 2025. The land use and population figures developed were used to calibrate flow models for future conditions. Documentation of land use and population is included in Section 2.

1.2.3 Wastewater Flows

To develop the flows used in the hydraulic model, the wastewater treatment facility's daily and monthly influent flow records from the City's annual reports were reviewed, as well as annual rainfall data collected by the City from January 2008 to December 2013. Dry weather and wet weather flow monitoring was performed during the periods of July 2, 2013 through August 7, 2013 and February 6, 2014 through April 9, 2014, to estimate dry weather and wet weather flow conditions.

California has been experiencing statewide drought conditions for the last three years, and the precipitation rates for the flow study period and the previous winter were especially low. The precipitation rates do not appear to be sufficient to saturate the ground and produce conditions which would allow infiltration into the sewer collection system. Additional flow monitoring would be required to confirm peaking factors developed as part of this study. The wastewater flows developed are documented in Section 4.

1.2.4 Collection System Overview

A general description of the collection system was developed to provide a basis for the condition assessment and Capital Improvement Plan (CIP). This overview includes a tabulation of wastewater collection system components, including manholes, gravity sewers, lift stations, and forcemains. The collection system overview is included in Section 3.

1.2.5 Collection System Analysis

Based on a skeletonized version of the updated wastewater GIS database exported into SewerCAD, a hydraulic model was developed to analyze the collection system. The model included an analysis of the existing system, as well as a future scenario. Existing and future demands were based on the City's GIS parcel layer, land use information and GIS layers from the General Plan, and available water billing information and prior flow monitoring data as discussed in Section 3.

Based on the hydraulic model, portions of the collection system which are at or above their estimated capacity under existing and future flows were identified. A comprehensive condition assessment of the existing collection system based on current City information was also completed including sewer mains, lift stations and manholes. Additional information on the collection system analysis is included in Section 7.

1.2.6 Lift Station Evaluation

Each of the City's twelve active lift stations were inspected and modeled. An evaluation of the hydraulic performance was also conducted, with influent flow rates based on the hydraulic model developed as part of this study. The results of the inspection and hydraulic evaluation are included in Section 6.

1.2.7 Capital Improvement Projects

The Project Team developed and prioritized a Capital Improvement Program. Budgetary cost estimates including typical percentages for design, overhead, administrative costs, and construction management were evaluated for

each of the proposed projects. The Project Team summarized the analyses and recommendations described earlier, based on City input, and developed a CIP for the collection system with projects prioritized according to immediate, future, and Operational and maintenance needs. A summary of the capital improvement projects is discussed in further detail in Section 8.

1.2.8 Staffing Evaluation

A staffing analyses was also conducted to evaluate the sufficiency of the City's current wastewater operations staff. This investigation demonstrated the department is understaffed, and 2 full time, and one part time additional staff members should be added to the team. Staffing is further discussed in Section 9.

1.2.9 Acknowledgements

MNS Engineers (MNS) and Michael K. Nunley and Associates (MKN) would like to thank the following City staff for their time, assistance and input in the development of this Wastewater Collection System Master Plan Update:

Nick Debar, Public Works Director
David Athey, PE, Deputy Public Works Director
Justin Black, Public Works Operations Manager
Callie Taylor, Senior Planner

The following MNS key team members were involved in the preparation of the Wastewater Collection System Master Plan Update:

Mark Rincón, PE
Julia Aranda, PE
Nick Panofsky, PE
Kurt Shellhause, PE

The following MKN key team members were involved in the preparation of the Wastewater Collection System Master Plan Update:

Michael K. Nunley, PE
Robert Lepore, GISP
Eileen Shields, PE

SECTION 2 Land Use and Population

Section 2 includes an evaluation of existing and future land use and population for the City, based on the General Plan updated in 2004 and discussions with City planning staff.

2.1 Land Use

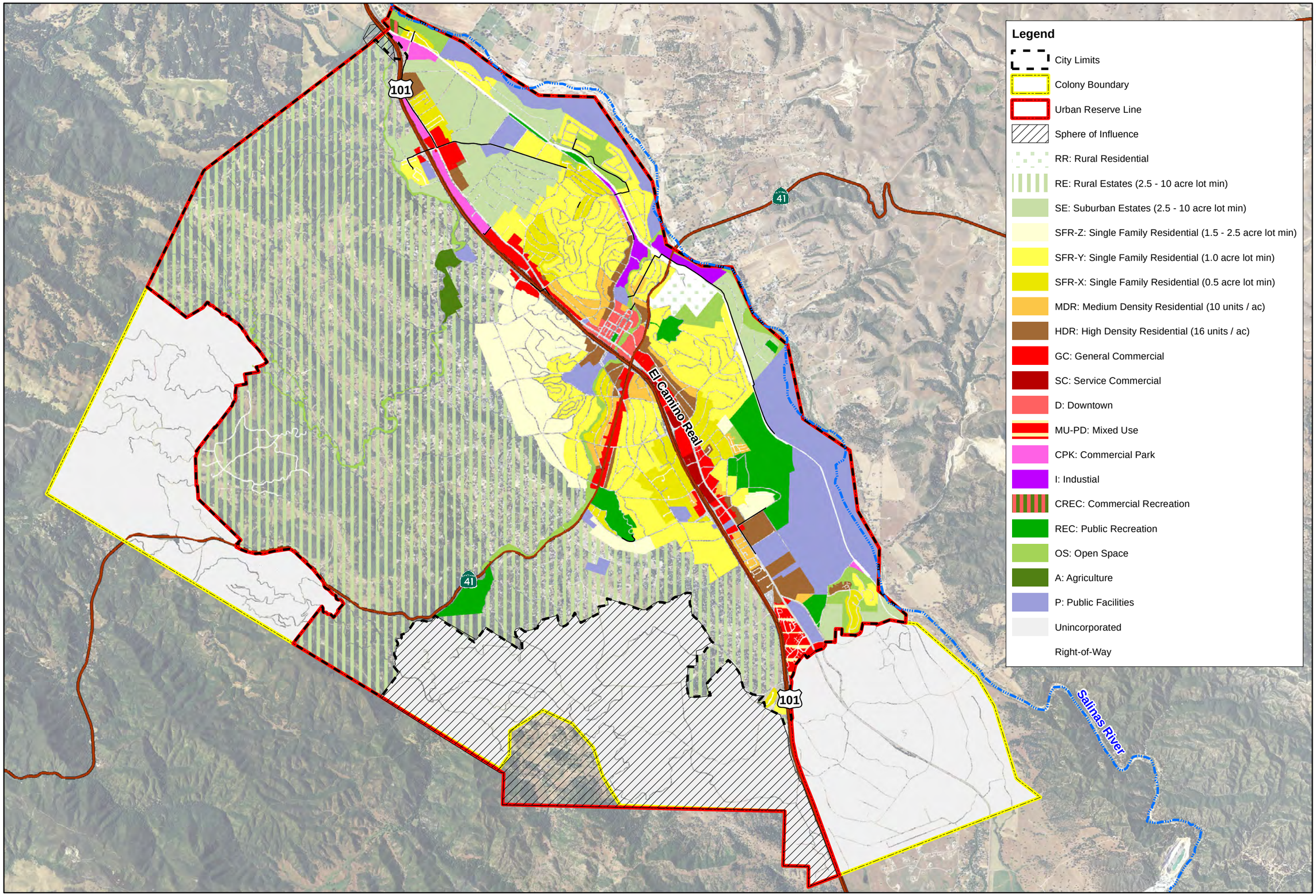
The City of Atascadero includes approximately 11,000 parcels and an estimated 15,000 acres. **Figure 2-1** shows the existing General Plan land uses throughout the City, the City's Urban Reserve Boundary, Sphere of Influence Boundary and Atascadero Colony Boundary. The City does not provide wastewater collection and treatment service to the entire City. Residential parcels one acre and larger are allowed to operate onsite collection and disposal systems. Currently wastewater service is limited to approximately 5,000 parcels covering an estimated 1,900 acres. Wastewater revenue is collected through fees incorporated into property taxes. Wastewater customers are recorded during issuance of final building occupancy permits and are identified in a GIS layer called "Sewered Parcels" within the City's enterprise GIS.

For the purpose of this Wastewater Collection System Master Plan Update, land use review and analysis was limited to the Sewered Parcels areas referred to as the "Wastewater Collection Service Area" (WCSA) shown in **Figure 2-2**. Future estimated expansion of the WCSA was based on approved residential and commercial development projects identified by the City's Community Development Department, potential residential and commercial development projects identified by the City's Community Development Department, and residential and commercial vacant parcels identified to receive wastewater services based on their General Plan designation. **Table 2-1** provides an overview of the existing and future land uses within the WCSA.

Table 2-1: Existing and Future Land Uses within Wastewater Service Area

Land Use	Designation	Existing Acres	City Approved Projects (Acres)	Future General Plan Area (without approved projects)	Additional Future Acreage for WCSA
Commercial Park	CPK	42	7	15	22
Commercial Recreation	CREC	1	0	0	0
Downtown	D	24	4	1	5
General Commercial	GC	186	44	29	73
High Density Residential (16 units /ac)	HDR	190	35	9	44
Industrial	I	15	0	9	9
Medium Density Residential (10 units /ac)	MDR	166	12	3	15
Mixed Use	MU-PD	16	11	0	11
Open Space	OS	2	0	0	0
Public Facilities	P	14	0	0	0
Rural Estates (2.5 - 10 acre lot min)	RE	71	0	0	0
Public Recreation	REC	2	0	0	0
Service Commercial	SC	37	0	2	2
Suburban Estates (2.5 - 10 acre min)	SE	9	2	0	2
Single Family Residential (0.5 acre min)	SFR-X	369	26	10	36
Single Family Residential (1.0 acre min)	SFR-Y	736	33	0	33
Single Family Residential (1.5 - 2.5 acre min)	SFR-Z	46	1	0	1
Unincorporated	Unincorporated	0	520	0	520
Total Existing Acreage		**1,926**			
Total Future Additional Acreage					**773**

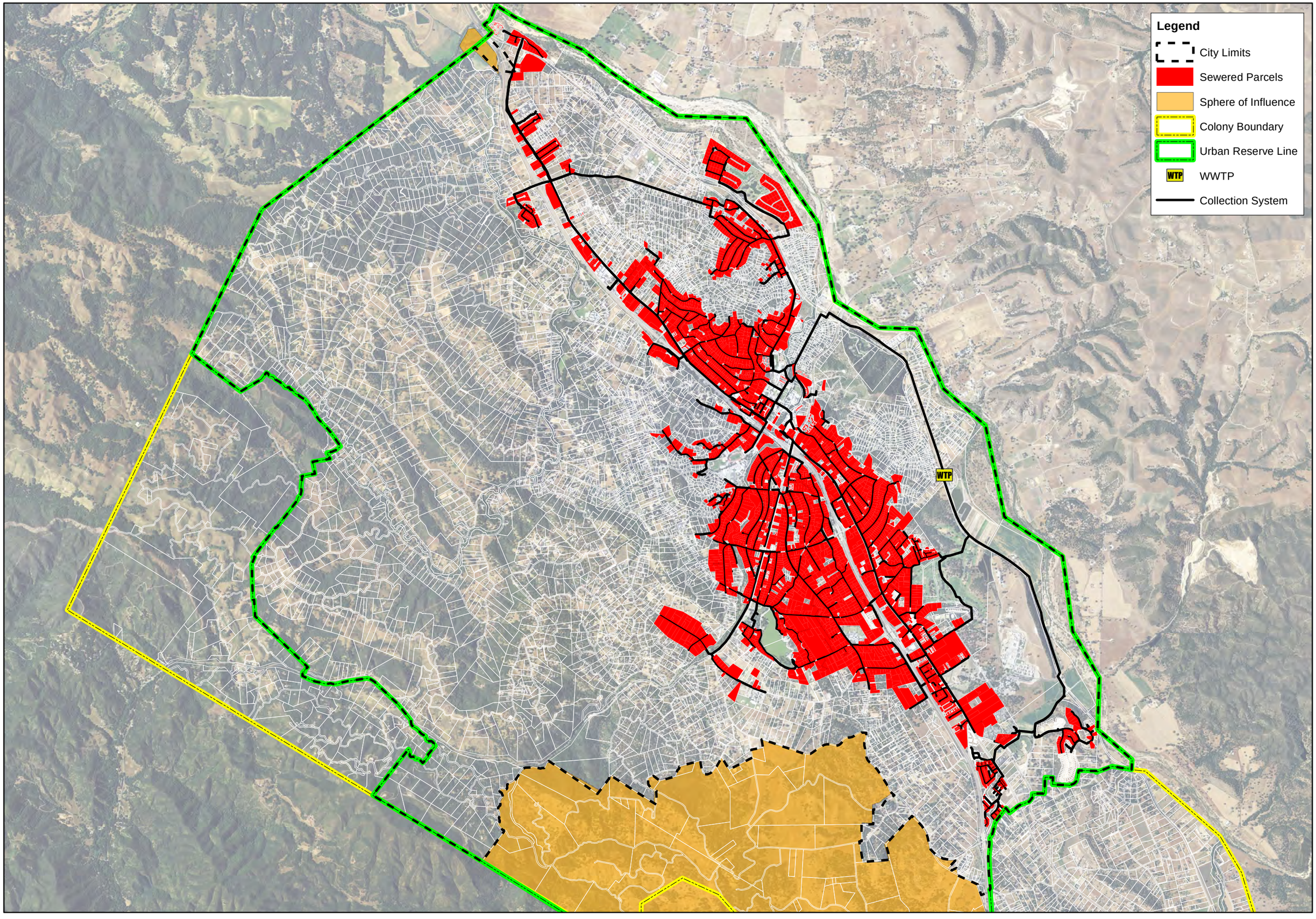
According to the General Plan, the WCSA will consist of approximately 2,700 acres in the future.



Wastewater Collection System Master Plan Update

Figure 2-1: Existing Land Use

Scale: NTS



Wastewater Collection System Master Plan Update

Figure 2-2: Wastewater Service Area

Scale: NTS

2.2 Population

The planning horizon for this Wastewater Collection System Master Plan Update is consistent with the City's current General Plan with a target date of 2025 for the future condition. The population within the current City limits is approximately 28,814, based on 2012 data from the United States Census Bureau. The City's General Plan 2025 population projection is estimated at 36,030. The City does not provide wastewater services to the entire City population as mentioned in the Section 2.1 and at this time no information is available to determine the existing population within the WCSA.

The City cannot reliably forecast when they will meet the future General Plan population of 36,030 people. While the Master Plan is based on the General Plan future land use, MKN recommends the City base their future wastewater demands on the following:

- Number of approved residential projects
- Vacant parcels that could be served in the future

These criteria are based on General Plan land use and development requirements in order to ensure general conformance with the plan. However, it will result in slightly lower population projections since some of the approved residential projects may not allow the full density permitted by the General Plan. This will provide a more conservative future population and future number of wastewater connections for developing impact fee and user charges in order to fund the wastewater enterprise. If an overly high population or number of connections is used, revenue per connection or customer will be lower and may not fund the City's Capital Improvement Program.

There are developed parcels within the Atascadero Colony Boundary which currently manage wastewater with onsite septic or other small scale treatment systems. In the future, some of these developed parcels may be connected to the sewer system. These parcels have not been included in this planning effort, as the timeline and impact of connecting developed parcels to the community sewer system is unknown and difficult to predict. If there is a driver for these existing (septic) facilities to tie-in to the community sewer system in the future, the Master Plan will need to be revisited to estimate potential impacts.

To determine future wastewater customer population, the City's Community Development Department was contacted to identify approved future residential development projects and estimate future wastewater service customers. **Table 2-2** provides an overview of residential development projects currently approved by the City. This table identifies the status of the residential development projects as of June 2013 and the number of remaining units to be built. Units built and approved prior to June 2013 were included in the existing wastewater flow estimates, while remaining units to be built will be included in the future wastewater flow projections and analysis. All residential development identified in **Table 2-2** will receive wastewater services in the future.

Table 2-2: Future City Approved Residential Developments[1]

	Project Name	Location	Total Approved Residential (Units)	Total Built as of June 2013 (Units)	Total Remaining as of June 2013 (Units)
1	Woodridge/Las Lomas Specific Plan: SFR lots	Halcon Road	156	52	104
2	Woodridge/Las Lomas Specific Plan: MFR lots	Halcon Road	135	0	135
3	Villas at Montecito PD-18	Montecito/Las Lomas	28	12	16
4	Dove Creek PD-12	ECR and Santa Barbara	279	213	66
5	Oak Grove Phase II : Peoples Self Help PD-17	1225 ECR	24	0	24
6	Tunitas PD-7	5516 Tunitas	4	0	4

Table 2-2: Future City Approved Residential Developments[1]					
Project Name		Location	Total Approved Residential (Units)	Total Built as of June 2013 (Units)	Total Remaining as of June 2013 (Units)
7	Southside Villas Apartments CUP	9190 San Diego Way	74	16	58
8	Emerald Ridge Homes	2705 ECR	42	0	42
9	Emerald Ridge II	2555 ECR	89	0	89
10	5310 Carrizo Road PD-17 (Machado)	5310 Carrizo	12	0	12
11	Westpac Mixed Use	9105 Principal	45	0	45
12	Westpac Mixed Use Phase II	9300 Pino Solo	4	0	4
13	Atascadero Ave-Vintage Homes	6540-6870 Serra	12	0	12
14	Atascadero Christian Home	8455 Santa Rosa	20	0	20
15	5802 Traffic Way: Downtown Mixed Use	5802 Traffic Way	5	0	5
16	1565 El Camino Real PD-17 (Alvarez)	1565 El Camino Real	6	0	6
17	Oak Haven	1155 ECR	62	0	62
18	Colony Square	6905 ECR	67	0	67
19	West Front Village	9000 West Front	32	0	32
20	The Acacias	4705 & 4713 El Camino Real	40	0	40
21	Navajoa PD 25	7705 & 7735 Navajoa Ave.	5	0	5
22	Ridgeway Court PD -29 (Beck)	5825 Ridgeway Court	8	0	8
23	7298 Santa Ysabel PD-25 (Patel)	7298 & 7312 Santa Ysabel	12	0	12
24	El Corte Planned Development (Eddings)	8570 El Corte	7	0	7
25	Triangle Park PD (Gearhart)	6905 Navajoa Ave	11	0	11
26	Rosario Historic PD (Ravatt)	5735 Rosario	10	0	10
27	Olmeda Condos (R. Emmons)	5435-5439 Olmeda	3	0	3
28	Spanish Ridge PD-7 (old Charnley tract map)	9425-9495 La Quinta	8	0	8
29	San Andres (Barre)	8255 San Andres	5	0	5
30	Curbaril Ave Condos	8760 Curbaril	3	0	3
31	Del Rio Road Commercial Area Specific Plan	2405 El Camino Real	42	0	42
		Total	**1,250**	**293**	**957**

[1]Approved residential development projects list provided by City of Atascadero Planning Department

In addition to the City approved residential projects identified in **Table 2-2**, the proposed Eagle Ranch Development may be considered for annexation by the City. This proposed development was included for analysis in this Master Plan Update at the direction of City staff.

The Eagle Ranch Development is a proposed housing and commercial development located in the southwest portion of the City. The Development is currently in the planning and permitting process, and according to the Notice of Intent to subdivide, the development will subdivide the 3,430 acre project site, and is anticipated to include:

- 494 single-family residential lots
- Up to 63 second units

- 93 multi-family, senior housing, workforce housing and mixed-use units
- Resort Hotel: 42.4 acres; 100 rooms and associated amenities
- Village Center: 1.8 acres; 15,000 sq. ft. retail, offices, postal facilities, meeting space
- Highway Commercial: 15.2 acres; sit down restaurant; 200-room hotel and facilities
- Public Park: 10.7 acres; includes small amphitheater
- Equestrian Staging Area: 1.5 acres
- Roads: 19.8 miles internal network of roads
- Trails: 16.2 miles of Class 1 multi-use paths, unpaved trails, and trail easement(s)
- Open Space: 2,585.1 acres; consisting of agricultural, private and public open space

Residential unit estimates provided by the project developer are included in **Table 2-3**.

Table 2-3: Proposed Eagle Ranch Project (Residential)

Project Name	Proposed Residential (Units)
Eagle Ranch MFR/senior/workforce to connect to sewer	93
Eagle Ranch SFR to connect to sewer	100
Total	**193**

Vacant residential parcels, which would receive wastewater services in the future (according to the General Plan) were also reviewed and those parcels are included in the future wastewater projections. These land uses, as identified by the City's Community Development Department, include: Single Family (0.5 acre lot min), Medium Density Residential (10 units/acre), and High Density Residential (16 units/acre). **Table 2-4** identifies the potential future residential units from these properties.

Table 2-4: Future Residential Units based on City General Plan

Land Use	Designation	Future Acres Based on City's General Plan	General Plan Units
High Density Residential (20 units / acre)	HDR	7.6	152
Medium Density Residential (10 units / acre)	MDR	2.7	27
Single Family Residential (0.5 acre lot min)	SFR-X	5.5	8
	Total	**15.8**	**187**

Based on the future unit counts from **Tables 2-2 through 2-4** and assuming a population density factor of 2.65 people/unit from the City's General Plan, it is anticipated the WSCA population will increase by 3,543 people by 2025.

2.3 Commercial Development

Future commercial wastewater flows were determined in coordination with the City's Community Development Department to identify approved future commercial projects. **Table 2-5** provides an overview of commercial development projects currently approved. This table identifies the status of the projects as of June 2013 and estimates the square footage of commercial development remaining to be built. Commercial projects built and approved prior to June 2013 were included in the existing wastewater flow estimates, while remaining square footage to be built is included in the future wastewater flow projections and analysis. All commercial development identified in **Table 2-5** would receive wastewater services.

Table 2-5: Future City Approved Commercial Developments[1]							
Project Name		Location	Lot Size (Acres)	Total Project Area (Sq Ft)	Project Type	Total Project Built as of June 2013 (Sq Ft)	Total Remaining as of June 2013 (Sq Ft)
1	Colony Square	6901-6917 El Camino Real	8.14	66,780	Retail/Restaurant	13,000	53,780
				35,000	Theater	35,000	0
				31,436	Office- Creekside City Hall	31,436	0
2	West Front	9010 West Front	9.36	15,000	Holiday Inn	15,000	0
		9000 West Front		2,500	Jack in the Box	2,500	0
		9002 West Front		4,880	Commercial retail	0	4,880
		9006 West Front		5,000	Restaurant	0	5,000
		9020 West Front		12,700	Business park	0	12,700
3	Fairfield Inn	9700 El Camino Real	1.97	51,740	Hotel: 100 Rooms	0	51,740
	Meridian Office Complex			15,000	Office	15,000	0
4	Moresco Plaza	7305 Morro	1.76	33,758	Office	22,197	11,561
5	The Annex	1905 El Camino Real	13	120,900	Retail/Restaurant	0	120,900
6	Walmart	2055 El Camino Real	26.1	139,560	Walmart & Retail pad	0	139,560
7	Home Depot/ Marriott Hotel Center	805-957 El Camino Real	29.6	166,255	Phase 1: Retail/HD	152,409	13,846
				89,818	Phase 2: 130 Room Hotel	0	89,818
		905 El Camino Real		18,000	Phase 2: Retail/Restaurant	0	18,000
8	Curbaril Center (Gearhart)	7955 Curbaril	1.46	17,000	Office	0	17,000
9	Montecito (Gearhart)	8950 Montecito	0.56	2,660	Tastee Freeze	2,660	0
		8970 Montecito	0.31	3,000	Retail	0	3,000
		9530 El Camino Real	0.24	2,744	K-Man	2,744	0
10	Restaurant (Kmart Center)	4300 El Camino Real	0.83	5,000	Restaurant	0	5,000
11	Dove Creek Commercial	11600 El Camino Real	5.19	60,000	Retail	0	60,000
12	8120 Morro Liquor store	8120 Morro	0.43	5,400	Retail	0	5,400
13	WestPac Mixed Use	9105 Principal	5.52	16,550	Retail/Office	0	16,550
14	The Acacias Mixed Use	4705 El Camino Real	1.71	6,500	Commercial	0	6,500
				2,166	Office/Indoor rec	0	2,166

Table 2-5: Future City Approved Commercial Developments[1]							
Project Name		Location	Lot Size (Acres)	Total Project Area (Sq Ft)	Project Type	Total Project Built as of June 2013 (Sq Ft)	Total Remaining as of June 2013 (Sq Ft)
15	Traffic Way (Downtown)	5802 Traffic	0.394	13,770	Retail	0	13,770
16	Hoff/Wysong (Downtown)	6490 El Camino Real	1.5	26,500	Retail/Restaurant/ Office	0	26,500
		Total	**100**	**990,017**		**291,946**	**677,671**
[1]Approved commercial development projects list provided by City of Atascadero Planning Department							

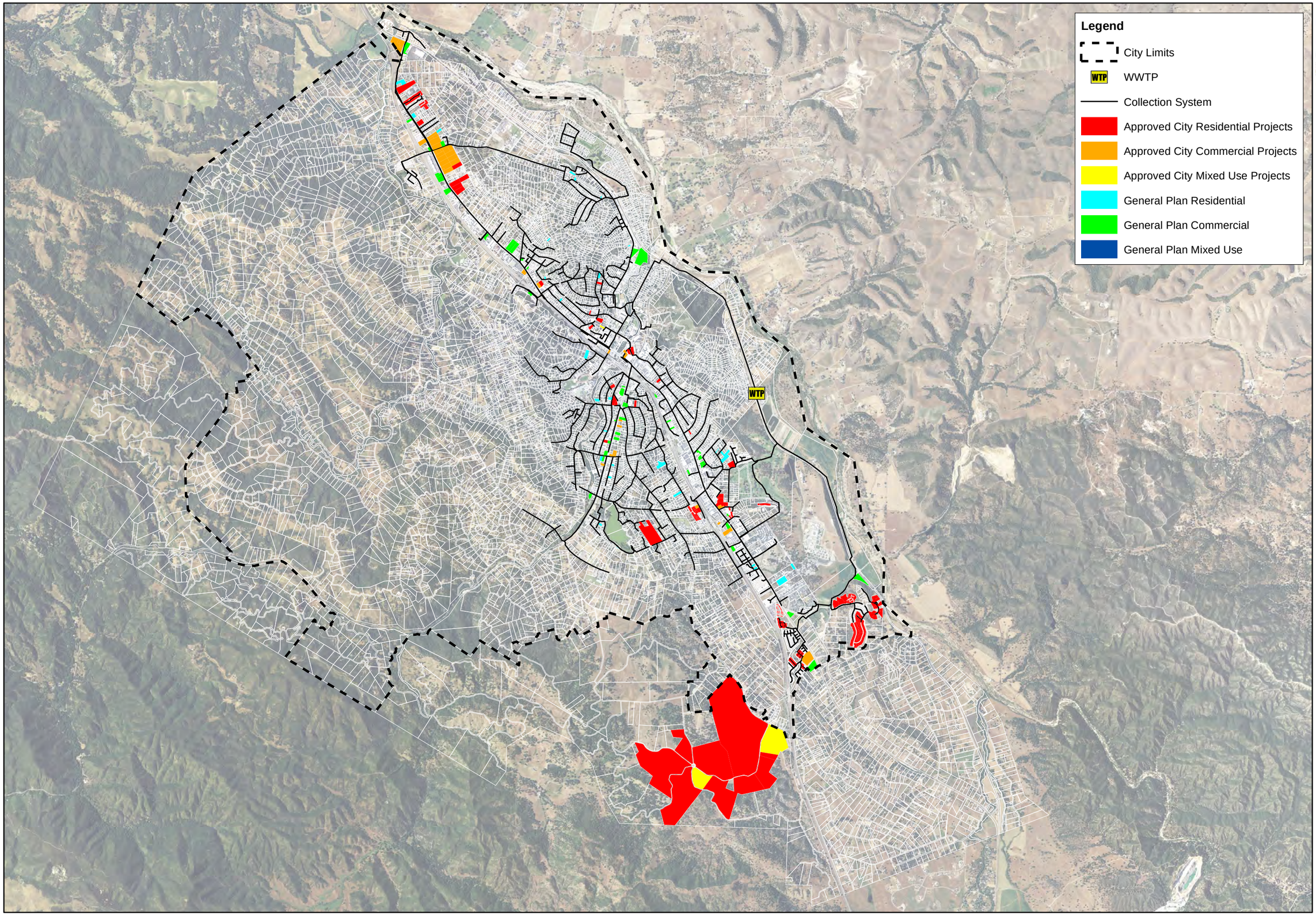
In addition to the City approved commercial projects identified above, the proposed Eagle Ranch project may be considered for annexation by the City, and is included in the analysis at the request of City staff. Commercial development estimates provided by the project developer have been included in **Table 2-6**.

Table 2-6: Proposed Eagle Ranch Project (Commercial)				
Project Name	**Location**	**Lot Size (Acres)**	**Total Project Area (Sq Ft)**	**Project Type**
Eagle Ranch: HWY Commercial	Southwest of City limits	15.2		Hotel: 200 rooms
			5,400	Restaurant
Eagle Ranch: Village Center	Southwest of City limits	2.8	15,000	Small Retail/Office
	Total	**18.0**	**20,400**	

Vacant commercial parcels, which would receive wastewater services in the future (according to the General Plan) were also evaluated and those parcels are included in the future wastewater projections. These land uses, as identified by the City's Community Development Department, include: General Commercial, Service Commercial, Downtown, Commercial Park and Industrial. **Table 2-7** identifies the potential future commercial acreage from development of the City's vacant commercial properties.

Table 2-7: Future Commercial Acreage based on City General Plan		
Land Use	**Designation**	**Future Acres Based on City's General Plan**
Commercial Park	CPK	14.9
Downtown	D	0.1
General Commercial	GC	27.0
Industrial	IND	9.1
Service Commercial	SC	1.6
	Total	**52.6**

Figure 2-3 identifies the location of the approved, potential, and General Plan residential and commercial development projects that would receive wastewater service in the future.



Wastewater Collection System Master Plan Update

Figure 2-3: Future Residential and Commercial Development

Scale: NTS

SECTION 3 Collection System Overview

Section 3 includes an overview of the gravity collection system, as well as discussion on several larger potential projects being considered by the City.

3.1 Gravity Pipes and Forcemains

Based on the GIS system updated as part of this project, the gravity sewer collection system consists of more than 63 miles of mains and trunk lines with sizes ranging from 4 to 21 inches. Gravity pipeline materials include polyvinyl chloride (PVC), vitrified clay pipe (VCP), asbestos cement (AC), and ductile iron pipe (DIP). Information on the material of every segment in the system is not known. A summary of the linear footage of each size of pipe in the gravity collection system is provided in **Table 3-1**.

Table 3-1: Existing Gravity Collection System Pipe Size

Diameter	Number of Pipe Segments	Length (feet)	Length (mi)	Percent of Total
Unknown	11	1,571	0.30	0.5%
4"	2	34	0.01	0.0%
6"	22	4,304	0.82	1.3%
8"	1,207	268,068	50.77	80.6%
10"	107	24,882	4.71	7.5%
12"	92	26,686	5.05	8.0%
15"	18	4,534	0.86	1.4%
18"	10	2,466	0.47	0.7%
21"	1	164	0.03	0.0%
Total	**1,470**	**332,709**	**63.01**	**100.0%**

A summary of the pipe materials in the gravity collection system is provided in **Table 3-2**.

Table 3-2: Existing Gravity Collection System Material

Material	Number of Pipes	Length (feet)	Length (mi)	Percent of Total
AC	15	3,189	0.60	1.0%
DIP	1	9	0.00	0.0%
PVC	586	124,055	23.50	37.3%
VCP	868	205,457	38.91	61.8%
Total	**1,470**	**332,709**	**63**	**100.0%**

There is a total of more than 36,000 linear feet of sewer forcemains in the collection system, ranging in size from 4 inches to 16 inches in diameter. Forcemains associated with abandoned lift stations are not included. Forcemain materials include PVC, AC, and DIP. A summary of the construction materials, lengths, ages, and lift station associated with each forcemain is provided in **Table 3-3**.

Table 3-3: Existing Forcemains

Lift Station No.	Size (Inches)	Length (Feet)	Length (Miles)	Material	Year Installed[1]
1	6	600	0.11	PVC CL200	2000
2	6	3,298	0.62	PVC CL200	1988
3	10	2,693	0.51	PVC	1988
4	4	443	0.08	DIP (Partially Encased in	1978

Table 3-3: Existing Forcemains					
Lift Station No.	**Size (Inches)**	**Length (Feet)**	**Length (Miles)**	**Material**	**Year Installed[1]**
				Steel)	
5	16	11,333	2.15	ACP	1974
6	6	955	0.18	DIP	1987
7	4	328	0.06	DIP	1987
9	4	1,001	0.19	PVC CL200	1992
11	4	1,274	0.24	DIP	1995
13	6	11,525	2.18	PVC CL150	2000
14	4	2,200	0.42	SCHD 40 PVC in 10" HDPE Sleeve	2004
15	4	588	0.11	HDPE	2005
Total		**36,238**	**6.86**		

[1]Year forcemains installed is based on record drawings, or if record drawings were not available, based on interviews with system operators.

There are approximately 1,460 sewer manholes in the sewer collection system. No additional information was available on manhole material or condition.

3.2 Lift Stations/Tributary Areas

The City currently owns and operates twelve lift stations. Due to the relatively large geographical range of the City and varied topography, more lift stations are required to convey wastewater to the treatment facility than a city with a concentrated population center with flat topography. A summary of the City's lift stations is provided in **Table 3-4**.

Table 3-4: Existing City Lift Stations		
Lift Station No.	**Location**	**Simplex Pumping Capacity (GPM)**
1	Adjacent to Hwy 101 - Access road between 3400 & 3450 El Camino Real	330
2	Adjacent to the entrance of Atascadero State Hospital - 10333 El Camino Real	675
3	Treatment Facility - 8005 Garbada Road	1,500
4	Northeast corner of Hwy 41 & Capistrano Avenue	220
5	5599 Traffic Way	2,325
6	4780 Traffic Way	642
7	Yerba Avenue	320
9	Lake View Drive	102
11	San Palo Road	160
13	On El Camino Real Near northbound Santa Cruz off-ramp	275
14	On San Ramon Road in Front of Apple Valley Park	167
15	N. Ferrocarril Road	N/A[1]

[1]Information on existing hydraulic conditions sufficient for determining pumping capacity at Lift Station No. 15 was not available for this study.

Lift Stations No. 8, No. 10, and No. 12 have been abandoned by the City and replaced with gravity system connections.

3.3 System Maintenance

The City conducts regular operation and maintenance on the collection system, including the following:

- Daily inspections of the twelve active lift stations
- Monthly lift station inspection and operation
- Underground utility locating
- Performance of main taps and lateral connections
- Field inspections of construction and modifications to the collection system
- Painting and other minor maintenance of lift stations
- Coordination of lift station pump maintenance with vendors
- Coordination of sewer main maintenance with vendors including monthly and annual line cleaning, described in detail below
- Response to wastewater emergencies
- Maintenance of computerized and manual records related to service and repair work performed; tracking, reporting, interpretation of information and adjusting maintenance schedules, and maintenance of program documentation

The City conducts regularly scheduled cleaning of the lift station wet wells mostly on an annual cleaning schedule. Lift Stations 3 and 6 are cleaned on a bi-annual basis, Lift Station 11 is cleaned quarterly, and Lift Stations 2 and 5 are cleaned on a bimonthly basis.

The City's Sewer System Management Plan also conducts system-wide cleaning of the collection system. One quarter of the City's sewer system is cleaned by hydro-jetting each year, resulting in the entire collection system being videotaped and cleaned every four years.

Previously mentioned in this section, City staff coordinate monthly and annual sewer main line cleaning. A current list of the sewer main lines on the regular cleaning schedule is included in **Table 3-5**.

Table 3-5: High Priority Line Cleaning List

Location	Upstream Manhole	Downstream Manhole	Current Cleaning Interval	Known Issue(s)	Length (Feet)
Outlets	R-ELC-14	UP10.2-2	Monthly	Belly/Grease	950
High School/101	DT3-3	DT3-6	Bi-Monthly	Offset	950
Creek Siphon	16A	16B	Trimesterly	Grease	200
Maple Street	MHP-3	MHP-2	Quarterly	Offset/Roots	535
Curbaril/ Hwy 41	NS-1	N20	Quarterly	Offset/Grease	295
West Mall/Palma	DT-1	DT-3	Quarterly	Roots	766
Roundtable			Annual (October)	Grit	106
Traffic Way	T2	T1	Annual (October)	Belly/Grit	181
Colony Park	T1B	T1A	Annual (October)	Belly/Grit	50
Colony Park	T1A	I1	Annual	Belly/Grit	138

Table 3-5: High Priority Line Cleaning List					
Location	**Upstream Manhole**	**Downstream Manhole**	**Current Cleaning Interval**	**Known Issue(s)**	**Length (Feet)**
			(October)		
Lewis/Estrada	DT1-1	DT-1	Annual (October)	Belly/Grit	290
6495 Olmeda	O1-IC	I4	Annual (October)	Belly/Grit	37
5235 Olmeda	O9	O8	Annual (October)	Roots	347
8130 Larga	N3.2C-2	N3.2C-1	Annual (October)	Roots	190
9576 Marchant	MH6	MH7	Annual (October)	Belly/Grit	175
7100 Valle	SY2.1B-2	SY2.1A-1	Annual (October)	Belly/Grit	239
5370 Fresno	T3.2-3	T3.2-2	Annual (October)	Belly/Grit	250
5265 Mariquita	T3.3-5	T3.3-4	Annual (October)	Belly/Grit	265
Curbaril Navajoa	N19	N18	Annual (October)	Belly/Grit	349
8060 Morro	N20	N21	Annual (October)	Belly/Grit	350
7955 San Andres	A7	A6	Annual (October)	Belly/Grit	262
El Camino Real/Regio	R-ELC-8	R-ELC-7	Annual (October)	Belly/Grit	401
El Camino Real/Carrizo	R-ELC-9	R-ELC-8	Annual (October)	Belly/Grit	392
1805 El Camino Real	R-ELC-13	R-ELC-12	Annual (October)	Belly/Grit	387
1745 El Camino Real	R-ELC-12	R-ELC-12A	Annual (October)	Belly/Grit	43
Hwy 41 to L.S.#5	SY-3	I-1	Annual (October)	Belly/Grease	3,300
				Total	**11,448**

3.4 Additional Collection System Condition Issues

In addition to the areas requiring regular maintenance included in **Table 3-5**, the City maintains a list of additional known condition issues within the collection system. These condition issues have been documented during recent CCTV inspections of the collection system and are highlighted in the Collection System Sewer System Defect Map included in Appendix A.

3.5 Lift Station Considerations

The City has identified three potential projects which could enhance system operation. These projects are discussed in detail in this section.

3.5.1 Lift Station No. 2 Abandonment or Replacement

Lift Station No. 2 is in very poor condition and is at the end of its useful life, as further discussed in Section 6.2. In 2014, an analysis was completed to determine the feasibility of two alternative strategies for Lift Station No. 2. Alternative No. 1 would be a reconstruction of the existing lift station at approximately the same location as the existing lift station. Alternative No. 2 would be abandonment of the existing lift station and the construction of a new gravity sewer to bypass the lift station. The new gravity sewer would start near the existing lift station and flow approximately 2,350 feet down El Camino Real and approximately 1,050 feet down Viejo Camino, discharging into the existing gravity collection system. Due to the topography along the proposed alignment of Alternative No. 2, portions of the new gravity sewer would be installed by micro-tunneling, as excavating to the required depth would be cost prohibitive.

The preliminary evaluation determined additional analysis is needed to confirm whether rerouting of wastewater flows by gravity is feasible. The hydraulic model developed as part of this current Master Plan update was used to evaluate existing and future flows to Lift Station No. 2, and determined the gravity collection system downstream of the proposed connection point on Viejo Camino is hydraulically limited, and does not have sufficient capacity to handle the additional flows resulting from the abandonment of Lift Station No. 2. Increasing the capacity of the downstream gravity collection system is estimated to be $4,300,000. As a result, Alternative No. 1, to reconstruct Lift Station No. 2, is recommended. The hydraulic impacts of both alternatives are explored in more detail in Section 7.

3.5.2 Lift Station No. 5 Upgrades

Lift Station No. 5 is in relatively poor condition; the City is considering alternative strategies to optimize the operation of the lift station and to reduce the risk of wastewater spills. In 2006, the City conducted a preliminary analysis of several alternative sites to replace Lift Station No. 5 (Cannon, 2006). In 2015, MKN completed an update to the 2006 study to review two additional lift station replacement sites, however upon further review the City has decided to replace Lift Station No. 5 at the current location to meet existing and future flows. A copy of the MKN Report update is included as Appendix B.

Budgetary costs for the proposed project are included in Section 8.

3.5.3 Lift Station No. 13 Modifications

The City is considering modifications to the Lift Station No. 13 forcemain to reduce complaints caused by odors near the discharge of the forcemain and to reduce the discharge pressure at the lift station. If the modifications to the forcemain are effective in reducing odors near the forcemain discharge, the City would like to remove the lime dosing facilities currently in use at Lift Station No. 13.

A preliminary analysis on the feasibility of making these modifications and hydraulic analysis of the potential impacts of this modification is included in Section 7.

SECTION 4 Wastewater Flows

Section 4 details the existing and anticipated future flows in the wastewater collection system and WWTF.

4.1 Historical Wastewater Treatment Facility Flow Records

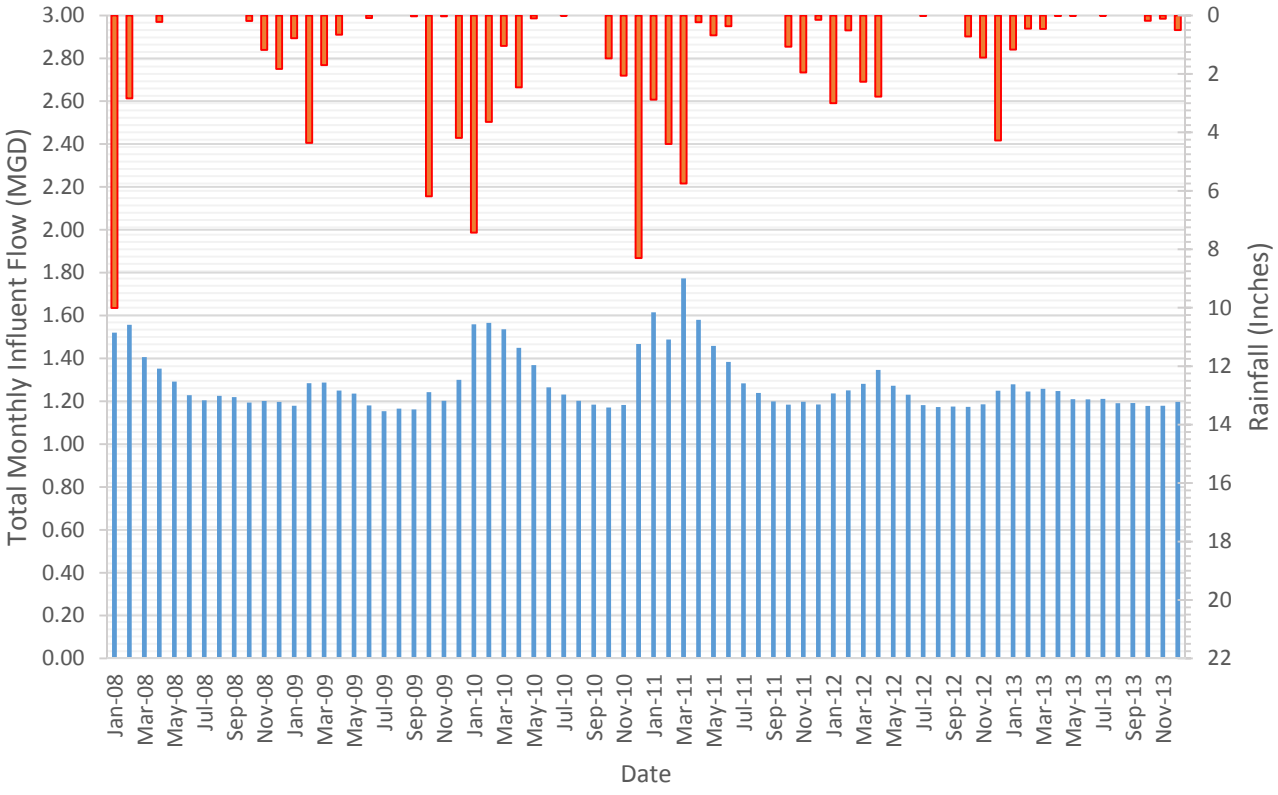
The wastewater treatment facility's daily and monthly influent flow records from the City's annual reports and annual rainfall data collected by the City from January 2008 to December 2013 were reviewed. **Table 4-1** provides a summary of the historical wastewater flow records. The average annual flow varies by more than ten percent from year to year, with the highest flows seen in 2011. Flows from 2011 were used for planning purposes in this report.

Table 4-1: Historical WWTF Influent Flows

Year	2008	2009	2010	2011	2012	2013
Flows (MGD)						
Average Daily Flow (ADF)	1.30	1.22	1.35	1.38	1.23	1.22
Maximum Month Flow (MMF)	1.56	1.30	1.57	1.77	1.35	1.28
Average Dry Weather Flow (ADWF)	1.27	1.19	1.25	1.30	1.21	1.20
Average Wet Weather Flow (AWWF)	1.37	1.26	1.42	1.44	1.25	1.24
Peak Day Dry Weather Flow (PDDWF)	1.57	1.34	1.71	1.55	1.35	1.93
Peak Day Wet Weather Flow (PDWWF)	2.34	1.93	2.76	3.01	1.65	1.37
Peak Daily Flow (PDF)	2.34	1.93	2.76	3.01	1.65	1.93

As shown in **Figure 4-1**, months of high rainfall appear to generally correlate with higher WWTF inflows.

Figure 4-1: Average Monthly WWTF Influent Flow and Rainfall – 2008 to 2013



Additionally, flow monitoring was performed dry weather and wet weather during the periods of July 2, 2013 to August 7, 2013 and February 6, 2014 to April 9, 2014 to estimate peak hour dry weather and wet weather flow conditions. A detailed discussion of the flow metering effort is provided in Section 4.3.

4.2 Wastewater Flow Conditions

The flow conditions used to analyze the wastewater collection system and referenced throughout the report are defined below:

4.2.1 Average Daily Flow (ADF)

ADF is the average daily wastewater flow over the course of a year and is generally obtained by averaging the mean monthly flows conveyed to a WWTF through the course of a year. The ADF was determined using annual average flow for 2011. This year was chosen since it appeared to represent peak conditions for the period reviewed (2008 – 2012) and is considered conservative. The existing ADF is estimated at 1.38 million gallons per day (MGD.)

4.2.2 Maximum Month Flow (MMF)

MMF is the average daily flow during the month with the maximum cumulative flow. MMF is often the regulated flow parameter for a WWTF discharge permit. The current waste discharge requirements for the City's WWTF, as specified in Regional Water Quality Control Board (RWQCB) Reclamation Order No.01-014, limit WWTF effluent to a maximum month flow of 2.39 MGD. The existing MMF is estimated at 1.77 MGD based on WWTF flow records.

4.2.3 Average Dry Weather (ADWF) and Wet Weather (AWWF) Flows

ADWF and AWWF are the average of daily flow rates experienced during dry and wet weather months, respectively. Consideration of average dry and wet weather flows allows analysis of treatment systems at appropriate flow rates and temperatures for the dry and wet seasons. Precipitation of 0.25 inches or more per month was assumed to identify wet weather months. Seasonal wastewater patterns indicated higher flows occurred during the wet weather or winter months, although rainfall at the WWTF itself could have a significant impact. The existing ADWF and AWWF are estimated at 1.3 and 1.44 MGD, respectively, based on WWTF influent flow records.

4.2.4 Peak Day Dry Weather Flow (PDDWF) and Wet Weather Flow (PDWWF)

PDDWF and PDWWF are the maximum daily flow rates experienced at the WWTF during dry and wet weather months respectively. The existing PDDWF and PDWWF are estimated at 1.55 and 3.01 MGD, respectively.

4.2.5 Peak Day Flow (PDF)

PDF is the maximum daily flow rate experienced at the WWTF and is used to design or evaluate hydraulic retention times for certain treatment processes. The existing PDF is estimated at 3.01 MGD.

4.2.6 Peak Hour Flow (PHF), Peak Hour Dry Weather Flow (PHDWF) and Peak Hour Wet Weather Flow (PHWWF)

PHF is the maximum one-hour flow experienced by the system, and is typically used for sizing collection system piping, lift stations, flow meters, interceptors, and headworks systems. Peak hour flow is typically derived from WWTF influent records, flow monitoring, or empirical equations used to estimate PHF based on service area population. For this report, PHDWF and PHWWF were estimated using the peaking factors found for the flow study conducted as described in the next section. The existing PHDWF is estimated to be 5.24 MGD and the PHWWF is estimated at 4.97 MGD. The existing PHF is the higher of the two, or 5.24 MGD.

4.3 Flow Monitoring Study

For this Wastewater Collection System Master Plan Update, four Greyline Instruments Stingray Pipe Band flow meters were installed in key locations throughout the City's collection system to collect peak hour dry weather and wet weather flow data. Data was collected for approximately six weeks from July 2, 2013 to August 7, 2013 for dry weather baseline conditions and February 6, 2014 to April 9, 2014 for wet weather flow conditions. The flow meters are insertion-type systems consisting of a circular metal band with sensors that are installed inside the upstream pipe within the sewer manhole. They are installed such that the wastewater entering the manhole travels over the sensors, which then read the wastewater temperature, depth, and velocity every 5 minutes. Since sewer flow monitoring does not record continuous flow, it only provides an estimate of the amount of wastewater flow generated over a study period.

Table 4-2 identifies the flow meter locations and characteristics:

Table 4-2: Flow Metering Locations for Dry and Wet Weather Flow		
GIS Manhole Identification	**Location**	**Pipe Diameter (inches)**
EC1	El Camino Real north of the On-Ramp to HWY 101	12
N1	Morro Road at the On-ramp/Off-Ramp to HWY 101	15
SAS2	City's WWTF property south of Lift Station #3	15
T1A	East of Traffic Way in the parking lot of the Community Center	12

Figure 4-2 shows the installation locations of the flow meter throughout the City and upstream tributary areas conveying flow to the flow meter.

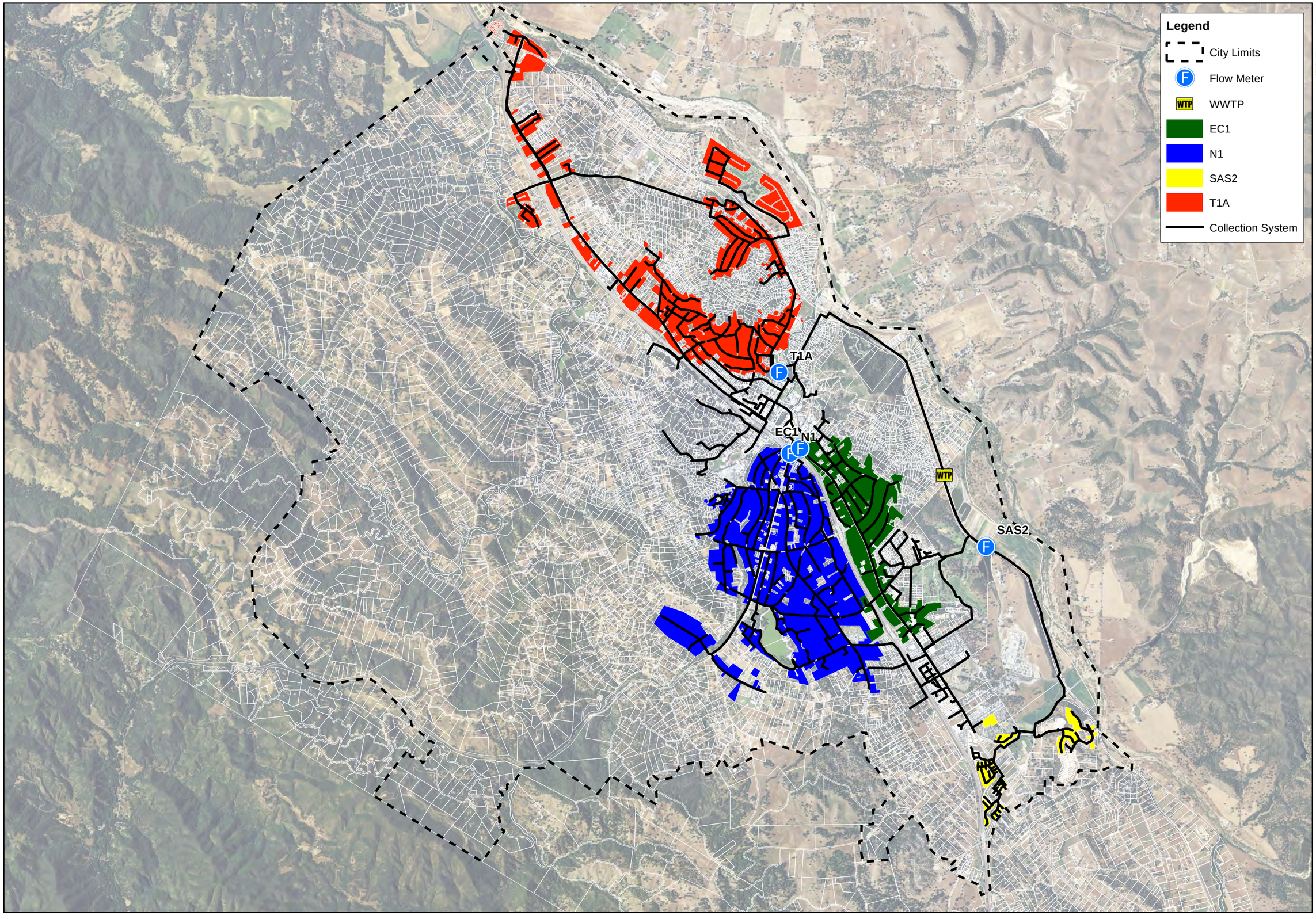
4.3.1 Summary of Flow Monitoring Study Results

California has been experiencing statewide drought conditions for the last three years, and the precipitation rates for the flow study period and the previous winter were especially low. The precipitation rates do not appear to be sufficient to saturate the ground and produce conditions which would allow infiltration into the sewer collection system. **Table 4-3** shows the precipitation during the flow monitoring study.

Table 4-3: Precipitation during Flow Monitoring Study	
Date	**Precipitation (Inches)**
March 26, 2014	0.05
March 27, 2014	0.08
March 30, 2014	0.11
April 1, 2014	0.48
April 2, 2014	0.5
April 3, 2014	0.03
Total	**1.25**

A summary of the flow monitoring study results and the precipitation during the wet weather period is provided in **Table 4-4.** Two of the four flow meter stations measured higher flows during the dry weather season. Results for the first half of the flow monitoring period were disregarded due to equipment failure. Graphs showing the peak hour flow rate and the average daily flow rate over time for each flow meter station are included in Appendix C.

Table 4-4: Summary of Flow Monitoring Study Results				
Flow Meter	**SMH EC1**	**SMH N1**	**SMH SAS2**	**SMH T1A**
Flow Meter Location	El Camino Real north of the On-Ramp to HWY 101	Highway 41 at the On-ramp/Off-ramp to HWY 101	City's WWTF property south of Lift Station #3	Traffic Way in the parking lot of the Community Center
Pipe Diameter (inches)	12	15	15	12
Estimated 2011 ADF (GPD)	177,314	384,232	113,763	351,146
Dry Weather Flow Monitoring Results (July 2, 2013 To August 8, 2013)				
Average Day (GPD)	127,704	399,567	130,881	200,820
Peak Day (GPD)	166,048	829,176	236,095	226,778
Average Day (GPM)	89	277	91	139
Peak Hour (GPM)	239	1,486	258	296
Peak Instantaneous (GPM)	628	2,190	578	675



Wastewater Collection System Master Plan Update

Figure 4-2: Flow Meter Locations

Scale: NTS

Table 4-4: Summary of Flow Monitoring Study Results				
Flow Meter	**SMH EC1**	**SMH N1**	**SMH SAS2**	**SMH T1A**
Peak Hour Peaking Factor	2.7	5.4	2.8	2.1
Wet Weather Flow Monitoring Results (March 11, 2014 to April 8, 2014)				
Average Day (GPD)	337,445	351,423	138,796	131,653
Peak Day (GPD)	685,196	381,078	279,552	184,228
Average Day (GPM)	234	244	96	91
Peak Hour (GPM)	620	449	635	442
Peak Instantaneous (GPM)	722	600	859	928
Peak Hour Peaking Factor	2.6	1.8	6.6	4.8

Due to some apparent inconsistencies in the data and insufficient rainfall, individual peaking factors for the various sewer sheds were inconclusive. Instead, the results were averaged by dividing the sum of the dry weather peak hour flow rates by the sum of the dry weather average day flow rates to get a "total PHDWF" peaking factor. The same was done for the wet weather – the sum of the wet weather peak hour flow rates was divided by the sum of the dry weather average day flow rates to get a "total PHWWF" peaking factor. The resulting PHDWF peaking factor was calculated at 3.8 and the PHWWF peaking factor was calculated at 3.6. The reasons for higher dry weather flows are unclear. An event during the dry weather monitoring period, such as Independence Day weekend events, may have drawn a greater number of visitors to the area. In the previous Master Plan, the City performed hydraulic analysis using peaking factors of 3, 5, and 7 but no justification was provided for these values. Therefore applying the 3.8 peak hour factor for hydraulic modeling is recommended. This value should be reevaluated in the future when better flow monitoring information is available during wet weather. In addition, given the high daily wet weather flows in the City in the past, a detailed I/I study is recommended in the future during years with higher precipitation.

4.4 Existing Wastewater Flows

Based on review and analysis of WWTF influent flow records and flow monitoring, the peaking factors shown in **Table 4-5** were developed for use in the capacity analysis of the collection and treatment systems. The peaking factors for peak hour dry weather flow and peak hour wet weather flow were estimated by taking an average of the respective peaking factors calculated in the Flow Monitoring Study.

Table 4-5: Existing Wastewater Flows			
Flow Condition	**Flow (MGD)**	**Peaking Factor**	**Source**
ADF	1.38	--	City of Atascadero WWTF 2011 Daily Flow Records
MMF	1.77	1.28	City of Atascadero WWTF 2011 Daily Flow Records
PDDWF	1.55	1.12	City of Atascadero WWTF 2011 Daily Flow Records
PDWWF	3.01	2.18	City of Atascadero WWTF 2011 Daily Flow Records
PHDWF	5.24	3.80	Dry Weather Flow Monitoring from July 2, 2013 to August 7, 2013
PHWWF	4.97	3.60	Wet Weather Flow Monitoring from March 11, 2014 to April 8, 2014
PHF	5.24	3.80	Flow Monitoring Study

4.5 Future Wastewater Flows

Table 4-6 provides a summary of the flow factors used to estimate the City's future residential and commercial wastewater flows. For potential commercial development projects and vacant commercial properties with undefined development square footage, flow factors from the 2002 Sewer Master Plan were used to estimate future flow.

Table 4-6: Flow Factors

Flow Type	Unit	Flow Factor (GPDU)
Residential	Persons	70
Hotel	Rooms	100
Approved and/or Proposed Commercial	Square Feet	0.1
Proposed and/or General Plan Commercial	Parcel	70 to 1,000

Table 4-7 identifies the additional wastewater flow that will be generated by the approved residential and commercial developments, proposed residential and commercial developments, and vacant residential and commercial properties based on the review presented in Section 2 and the flow factors in **Table 4-6**.

Table 4-7: Additional Future Flow

Flow Type	Development Type	Total	Unit	Flow Factor (GPDU)	Flow (GPD)
Residential	City Approved Projects	3,048	Persons	70	213,360
	General Plan Vacant Properties	520	Persons	70	36,400
				Subtotal	**249,760**
Hotel	City Approved Projects	430	Rooms	100	43,000
				Subtotal	**43,000**
Commercial	City Approved Projects	698,071	Sqft	0.1	69,807
	General Plan Vacant Properties – Commercial Park	7	Parcels	100	700
	General Plan Vacant Properties – General Commercial	38	Parcels	90	3,420
	General Plan Vacant Properties – Industrial	2	Parcels	1000	2,000
	General Plan Vacant Properties – Service Commercial	5	Parcels	400	2,000
				Subtotal	**77,927**
				Total Future Flow	**370,687**

The future additional ADF was added to the existing ADF to determine the total future ADF**.** Future peak flows were projected using peaking factors developed from the historical flow analysis as summarized in **Table 2-4**.

4.6 Eagle Ranch Wastewater Flows

The peak flows from the Eagle Ranch Development (Development) were assessed separately, as the current proposal includes a new City lift station to convey flows from the development to the existing collection system.

Only a fraction of the wastewater generated by the Development will be directed to the City's wastewater system. The remainder of the wastewater will be treated with on-site septic systems. The portion of the development which is proposed to be connected to the City's wastewater system includes:

- Multi-family Residential (MFR)/senior/workforce: 93 units
- Single-family Residential (SFR): 100 units
- Highway Commercial: Hotel 200 rooms, and restaurants: 5,400 square feet
- Village Center – Small retail/office: 15,000 square feet

A pressure system is being investigated for the portion of the development receiving City sewer service, based on the preliminary plans submitted to the City. The majority of the homes and commercial development connected to the system would have an individual grinder pump station, pumping to a common gravity main. The gravity main would discharge into a new City lift station. The Development is proposing to connect the forcemain from the new City lift station to existing manhole SAS44 near the round-about at the intersection of Cashin Street, Bliss Street, Vereda Avenue, and Arbol Del Rosal Way. The City may require an alternate connection point, at manhole SAS34 at the intersection of Cashin Street and El Camino Real. This location is in a more heavily trafficked area with fewer homes in the immediate vicinity. This manhole also has a 10-inch discharge, rather than an 8-inch discharge, which will accommodate additional future capacity. The City may also require a new transition manhole upstream of manhole SAS34, with a vortex drop inlet to assist in reducing odors from the forcemain discharge.

Utilizing the flow factors included in **Table 4-6**, and the peaking factor of 3.8 shown in **Table 4-5**, the average and peak hour flows anticipated from the Development are calculated in **Table 4-8**. A hydraulic analysis of the potential impacts of the Development is included in Section 7. It is assumed that the new City lift station will be sized to meet the projected peak hour flow. Therefore, future flows from the Development were modeled by applying the peak hour flow to the proposed connection point (manhole SAS44) to evaluate potential impacts.

Table 4-8: Eagle Range Wastewater Flows

Residential Flows					
Development Category	**Quantity**	**Residents Per Residential Unit**	**Flow Factor (GPDU)**	**Average Flow (GPD)**	**Peak Hour Flow (GPD)**
MFR/senior/workforce units	93	2.65	70	17,252	65,556
Single Family Residential units	100	2.65	70	18,550	70,490
Commercial Flows					
Development Category	**Quantity**		**Flow Factor (GPDU)**	**Average Flow (GPD)**	**Peak Hour Flow (GPD)**
Hotel Rooms	200		100	20,000	76,000
Restaurant	5,400		0.1	540	2,052
Commercial	1,5000		0.1	1,500	5,700
			Total	**57,842**	**219,798**

4.7 Projected Future Flows

The future wastewater flow conditions are summarized in **Table 4-9**, and were used to analyze the capacity of the existing collection system during future wastewater flow conditions.

Table 4-9: Projected Future Wastewater Flows		
Flow Condition	**Flow (MGD)**	**Peaking Factor**
ADF	1.75	--
MMF	2.28	1.28
PDDWF	1.92	1.12
PDWWF	3.85	2.18
PHF	6.65	3.80

SECTION 5 Inflow and Infiltration

Inflow and Infiltration (I/I) consists of stormwater entering the collection system as a result of a specific rainfall event as well as groundwater infiltration. I/I enters the collection system as inflow through direct connections to storm drains, area drains, roof leaders, manhole lids, or other improper connections. Stormwater also can infiltrate through the soil and enter the sewer pipe through defective joints, pipe cracks, and other defects.

I/I is an important flow component because it typically determines the peak flow rate used to determine the proper sewer size and maximum treatment capacity. High levels of I/I can require equipment to be oversized for the majority of flow rates, can require the construction of equalization basins, and can increase the risk of sanitary sewer overflows.

5.1 Atascadero Rainfall

Total annual rainfall in the City typically ranges between 10 and 30 inches. I/I observed in the collection system appears to directly correlate with the quantity of annual rainfall.

5.2 I/I Analysis

Due to the small total quantity of rainfall observed during the 2013/2014 rainy season, it is believed typical levels of ground saturation were not achieved. As a result, levels of I/I in the system observed while flow meters were installed are not representative of a typical year; normal year peak wet weather flow rates are significantly higher. Therefore, the flow meters installed in the collection system were not used to quantify the level of I/I in the system.

For this analysis, measurement of overall system I/I was conducted. Daily flows were examined from January 1, 2008, through December 31, 2013. During this period, average dry weather flow was 1.23 MGD. The maximum daily influent flow was 3.01 MGD, which occurred on March 20, 2011. This indicates flows contributed to the system due to I/I may have increased the daily flow to the WWTF by 145%, or 1,780,000 gallons compared to the long-term (5-year) annual average).

The historical influent flow rates are shown in **Table 5-1**.

Table 5-1: Historical WWTF Influent Flows (MGD)

Year	2008	2009	2010	2011	2012	2013	2008-2013 Average
ADF	1.30	1.22	1.35	1.38	1.23	1.22	1.28
MMF	1.56	1.30	1.57	1.77	1.35	1.28	1.47
ADWF	1.27	1.19	1.25	1.30	1.21	1.20	1.23
AWWF	1.37	1.26	1.42	1.44	1.25	1.24	1.33
PDDWF	1.57	1.34	1.71	1.35	1.35	1.93	1.54
PDWWF	2.34	1.93	2.76	3.01	1.65	1.37	2.18
PDF	2.34	1.93	2.76	3.01	1.65	1.93	2.27

Historical influent flow rates as a percentage of average dry weather flow are shown in **Table 5-2**.

Table 5-2: Historical WWTF Influent Flows (Percent of ADF)

Year	2008	2009	2010	2011	2012	2013	2008-2013 Average
ADF	103%	103%	108%	107%	102%	101%	104%
MMF	123%	110%	125%	137%	112%	106%	119%
ADWF	100%	100%	100%	100%	100%	100%	100%
AWWF	108%	106%	113%	111%	103%	104%	108%

Table 5-2: Historical WWTF Influent Flows (Percent of ADF)							
Year	2008	2009	2010	2011	2012	2013	2008-2013 Average
PDDWF	124%	113%	137%	104%	112%	161%	125%
PDWWF	185%	163%	221%	232%	137%	114%	176%
PDF	185%	163%	221%	232%	137%	161%	184%

In 2011, it is estimated an additional 30 million gallons of wastewater may have been treated at the treatment facility due to I/I.

5.3 Reducing I/I

One of the primary strategies for reducing I/I, is to replace or rehabilitate collection system components including manholes, main lines, and sewer laterals.

Available sewer main replacement and rehabilitation methods to reduce I/I include:

- Smoke Testing
- Open Cut Replacements
- Point Repairs
- Pipe Bursting
- Cured-In-Place Pipe (CIPP) Rehabilitation
- Spiral Wound Liner Rehabilitation
- Spray-On Lining Rehabilitation
- Modified Cross Section Lining Rehabilitation
- Sliplining

Available manhole rehabilitation methods include:

- Replacing Manhole Frames and Covers
- Raising Manhole Frames and Covers
- Internal Structural Coatings
- Insitu Structural Replacement
- Manhole Replacement

There are also several options available for replacing or rehabilitating sewer laterals to reduce I/I.

5.4 Recommendations

MNS recommends the City implement additional flow monitoring during wet weather to isolate regions in the collection system where levels of I/I are highest. Once these areas are identified, the City may implement a second round of wet weather flow monitoring to further isolate areas where I/I is the highest.

Once the areas of highest I/I are identified, a combination of CCTV inspections and smoke testing can be implemented to identify specific locations where I/I is entering the system. Once identified, these locations can be repaired with one of the available technologies for reducing I/I.

SECTION 6 Lift Station Evaluation

The City currently owns and operates twelve lift stations. Due to the relatively large geographical range of the City and varied topography, more lift stations are required to convey wastewater to the treatment facility than a city with a concentrated population center with flat topography. A summary of the City's lift stations is shown in **Table 6-1**.

Table 6-1: Existing City Lift Stations

Lift Station No.	Location	City Rated Simplex Pumping Capacity (GPM)	Pump Information
1	Adjacent to Hwy 101 - Access road between 3400 & 3450 El Camino Real	330	2 x 10 HP EBARRA Model #100DLKFU67.5
2	Adjacent to entrance of Atascadero State Hospital - 10333 El Camino Real	650	2 x 50 HP ESSCO 4x4x3" 1750 RPM 320 TY Exp motor, Serial # 94062-1
3	Wastewater Treatment Facility - 8005 Garbada Road	1,500	2 x 30HP EBARA #150DLFU622
4	Northeast corner of Hwy 41 and Capistrano Avenue	230	2 x 3 HP EBARA
5	5599 Traffic Way	2,325	50 HP FAIRBANKS & MORSE, 50 HP VTSH, 60 HP Ebarra Submersible model# 150DSC4AOFM46060
6	4780 Traffic Way	640	2 x 20 HP EBARA #100DLFMU615
7	Yerba Avenue, between Dolores Avenue and Arena Avenue	320	2 x 5 HP EBARA
9	Lake View Drive, Near Santa Rosa Road	90	2 x 3 HP WEMCO Serial No. 9190 736-36
11	San Palo Road, southeast of San Anselmo Road	154	2 x 5 HP MYERS
13	On El Camino near north bound Santa Cruz off-Ramp	270	2 x 40 HP VAUGHAN Serial Numbers: P.1 59959-A & B
14	On San Ramon in front of Apple Valley Park	108	2 x 5 Hp MYERS WGX50
15	N. Ferrocarril Road, north of intersection with El Camino Real	N/A[1]	2 x Myers 5 HP Catalog # WGX50-23-25

[1]Information on existing hydraulic conditions sufficient for determining pumping capacity at Lift Station No. 15 was not available for this study.

Lift Stations No. 8, No. 10, and No. 12 have been abandoned by the City and converted to gravity systems.

A summary of the City's forcemains associated with each lift station is shown in **Table 6-2**.

Table 6-2: Existing Forcemains				
Lift Station No.	Size (Inches)	Length (Feet)	Material	Year Installed[1]
1	6	600	PVC CL200	2000
2	6	3,298	PVC CL200	1998
3	10	2,693	PVC	1988
4	4	443	DIP (Partially Encased in Steel)	1978
5	16	11,333	ACP	1974
6	6	955	DIP	1987
7	4	328	DIP	1987
9	4	1,001	PVC CL200	1992
11	4	1,274	DIP	1995
13	6	11,525	PVC CL150	2000
14	4	2,200	SCH 40 PVC in 10" HDPE Sleeve	2004
15	4	588	HDPE	2005
Total		**36,238**		

[1]Ages of forcemains are based on available record drawings if available, otherwise, ages were approximated by operation staff.

6.1 Lift Station Condition Assessment and Improvements

A condition assessment of each lift station was conducted. The following recommendations apply to all of the active lift stations, as well as future lift stations that may be under consideration by City staff:

- Provide signage on all lift station wet wells indicating they are a Permit Required Confined Space.
- Review policy on stocking extra valves, pumps and other wear parts as appropriate for each lift. Establish an inventory of replacement parts to reduce lift station down time following equipment failure.
- Consider providing fall protection netting or other fall protection at wet well access points to prevent injury or death.
- Provide pressure gauges on the discharge piping of each lift station.
- Implement a valve exercising and maintenance program to keep all lift station valves in working order.
- All lift stations are equipped with single forcemains. Consider installing parallel forcemains for high risk facilities, including creek crossings.

In addition to these recommendations, MNS recommends the City consider the following:

- Lift Stations No. 3, 14 and 15 are not equipped with onsite lighting. When service of these lift stations is required at night, operators are required to use portable lighting to illuminate the area. In order to streamline night time work at the lift stations, the City should consider installing permanent lighting at lift stations that are not currently equipped with this feature, if portable lighting is insufficient.
- Wastewater flow is only monitored in real time at Lift Stations No. 3 and 5, and at the treatment facility. Flow at the remaining lift stations is indirectly monitored based on pump run time. If the City believes additional real time flow data would be valuable for identifying pump performance problems, flow meters could be installed on the forcemains for the lift stations that do not discharge directly to the treatment facility.

In addition to these general recommendations, specific observations applying to each lift station are included in Appendix D.

6.2 Lift Station Hydraulic Performance

An analysis of the hydraulic operating conditions of each lift station was conducted. A summary of the hydraulic loading and capacity for each lift station is included in **Table 6-3**. The calculation of the existing and future peak flow rates to each lift station is discussed in detail in Section 7. The peak flow rates include peak hour flows as well as pumped flow with one pump operating from upstream lift stations. Calculated active wetwell cycle volume is the volume pumped in each on/off cycle with one pump operating at the peak hour influent flow rate. Lift station efficiency approximates how closely the operating conditions match the optimum efficiency point of the pumps in service.

Table 6-3: Lift Station Hydraulic Summary								
Lift Station No.	Calculated Active Wetwell Cycle Volume (Gallons)	Existing Peak Hour Flow Rate (GPM)	Future Peak Hour Flow Rate (GPM)	Calculated Simplex Pump Capacity (GPM)	Approximate Efficiency at Primary Operating Point	Calculated Duplex Pump Capacity (GPM)	Existing Cycle Frequency at Peak Flow (Cycles/Hr)	Future Max Cycle Time (Cycles/Hr)
1	846	10[1]	10[1]	330	50%	380	0.7	0.7
2	5,710	457	565	650	63%	575	1.4	0.8
3	1,880	1,150	1,325	1,500	65%	1,950	8.6	4.9
4	734	26	26	230	55%	260	1.9	1.9
5	4,314	3,136	3,358	2,325	57%	3,050[2]	N/A[3]	N/A[3]
6	1,234	866	866	640	78%	800	N/A[3]	N/A[3]
7	338	11	11	320	53%	380	1.9	1.9
9	211	24	24	90	Acceptable[4]	100	5.0	5.0
11	402	24	24	154	Acceptable[4]	200	3.0	3.0
13	1,053	795[5]	1,111[5]	270	46%	320	N/A[3]	N/A[3]
14	296	54[6]	54[6]	108	Acceptable[4]	136	5.5	5.5
15[7]	188	3	11	-	-	-	-	-

[1]Peak inflow as reported by record drawings. No data on lift station flow was available for this study.
[2]Lift Station No. 5 has three pumps in service. With three pumps operating, the lift station can pump existing peak hour flow rates, but has insufficient capacity to meet future peak hour flows.
[3]Wet well cycle time cannot be calculated due to lift station being under capacity during peak hour flow.
[4]Pump efficiencies are indicated as "Acceptable" where available pump curves do not include efficiencies, but operating point is in the normal operating range of the pump.
[5]Lift Station No. 13 is significantly under capacity due to the high discharge flow rate from Lift Station No. 1. MNS Recommends reducing the discharge flow rate from Lift Station No. 1.
[6]This lift station was constructed recently by a developer, and turned over to the City. As a result, limited information is available.
[7]Sufficient information was not available to model the operating conditions for Lift Station No. 15. The City has not reported any operational issues with this lift station.

A pump curve and system curve have been developed for each lift station to determine the operating points. These curves are included in Appendix E. System curves were based on available information for each lift station and forcemain. If record drawings were not available, losses due to fittings and other minor losses were assumed based on a typical forcemain design and the alignments indicated in the GIS system. System curves include wetwell high and low levels to provide a range of operating conditions. The primary operating point is assumed to be the point where the system curve is equal to the pump curve with one pump operating when the water level in the wetwell is at the pump shutoff level.

6.2.1 Wet Well Emergency Response Time

In the event of a power outage, pump failure, or other system failure, there is the potential for the City's lift stations to overflow and cause a spill. Only Lift Station Nos. 5 and 6 are equipped with a permanent onsite back-up generator. The City also has three trailer mounted emergency back-up generators which can be mobilized to provide emergency power to any of the remaining lift stations. Each of the lift stations has a bypass connection which can be utilized with the trailer mounted back-up pumps.

In the event of an emergency, Lift Station No. 3 and Lift Station No. 5 are designed to contain wastewater onsite to avoid a spill. Lift Station No. 3 will overflow into one of the percolation ponds at the wastewater treatment facility. Lift Station No. 5 will overflow into an emergency bypass basin.

An analysis was conducted to determine minimum time to spill for each lift station. For this analysis, it was assumed a power failure occurs when the depth of liquid in the wet well is at the level which triggers the lead pump to start, also referred to as the "On" Level. The minimum time to spill is assumed to be time to fill the wet well from the "On" level, to the point of spilling at the Peak Daily Influent Flow Rate. Additional storage capacity in the collection system was not considered. This analysis was not completed for Lift Stations 3 and 5, as they are equipped with overflow basins. The results of this analysis are included in **Table 6-4**.

Table 6-4: Emergency Time to Spill

Lift Station No.	Total Wetwell Volume (Gallons)	Volume to Spill	Existing Peak Dry Weather Flow Rate (GPM)	Calculated Time to Spill (Minutes)
1	3,173	2,115	10	212
2	32,940	25,376	449	56
4	2,556	1,763	26	68
6	2,115	1,293	627	1
7	1,904	1,311	11	119
9	3,078	2,655	22	111
11	2,666	2,062	29	86
13	5,829	3,760	330	5
14	3,702	2,380	54	44
15	1,128	752	3	251

6.2.2 Emergency Response Recommendations

Based on the calculated time to spill for each of the lift stations, the City should consider the need for back-up generation at Lift Station No. 13. Based on an assumed mobilization time of 30 minutes, there would be sufficient time to mobilize a back-up generator to the other lift stations prior to a spill occurring under peak hour loading conditions if the City can mobilize trailer mounted back-up generators within this time.

6.3 Summary of Hydraulic Deficiencies

Based on the hydraulic analysis of the lift stations, hydraulic deficiencies were identified at some lift stations. These deficiencies and corresponding recommended improvements are described in **Table 6-6**.

Table 6-6: Hydraulic Deficiencies

Lift Station No.	Hydraulic Deficiencies	Recommendations
1	The wet well is oversized (less than 1 cycle per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues. In addition to lift station hydraulic deficiencies, operation of this lift station during peak flows causes downstream hydraulic deficiencies.	Modify pump set points to increase pump cycle time, and reduce sewage age in the system. Replace pumps with lower capacity pumps to relieve downstream capacity issues.
2	The pumps are oversized for the current hydraulic conditions, and are operating near the end of the pump curve.	If pump station is replaced, size pumps to meet current hydraulic conditions.
4	The wet well is oversized (less than 2 cycles per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues.	Modify pump set points to reduce pump cycle time, and reduce sewage age in the system.
5	The lift station has insufficient pump capacity in the future condition to handle peak flows without operating the lag pump.	As part of the Capital Improvement Project to replace or rehabilitate Lift Station No. 5, peak future flows should be taken into account in the design.
6	The lift station has insufficient pump capacity in the existing and future condition to handle peak flows without spilling.	Replace the pumps at the lift station with higher capacity submersible pumps.
11	The wet well is oversized (less than 2 cycles per hour during peak hour flow conditions), resulting in aging wastewater in lift station and potential odor issues.	Modify pump set points to reduce pump cycle time, and reduce sewage age in the system.
13	The lift station has insufficient pump capacity in the existing condition to handle peak flows without spilling.	Replace pumps at Lift Station No. 1 with lower capacity pumps to reduce influent flow rates. Increase the discharge piping at the lift station from 3” to 6”, and implement the proposed improvements described in Section 7.10.

SECTION 7 Collection System Analysis

A hydraulic model was developed to analyze the hydraulic functionality of the wastewater collection system. The primary goals of this analysis are to determine where the collection system is hydraulically under capacity, and to determine peak wastewater flows to each of the lift stations and the treatment facility.

7.1 Design Criteria

Bentley SewerCAD V8i SELECT Series 3 was used to model the wastewater collection system. Physical properties of the collection system were input into the model based on a GIS model provided by MKN. The GIS shapefiles included information on the existing sewer manholes, forcemains and gravity sewer mains. The forcemain and gravity main shapefiles contain physical properties including pipe diameter, material, and pipe identification numbers. The sewer manhole shapefiles included inverts, rim elevation and City label. For some sewer manholes the rim elevations were not available from as-built information.

Wastewater flow inputs were developed by MKN, based on water billing records from Atascadero Mutual Water Company and adjusted by a ratio of 71%, equal to the average wastewater flow rates for 2011. A detailed discussion of the development of the model flows is included in Section 4. A peaking factor of 3.80 was used to model the peak hour flow, as shown in **Table 4-5**.

7.2 Model Development

Assumptions were made to develop a working hydraulic model with SewerCAD. These assumptions included:

- For manholes with manhole rim elevations not included in the GIS model, elevations were assumed based on ground elevation from the City of Atascadero's contour map dated February 2009
- Flows were input into the model, including locations and quantity, as provided by MKN. No additional flows were included or added
- The Manning's coefficient used throughout the model is dependent on the pipe material as follows;
  ACP – 0.011
  DIP – 0.015
  PVC – 0.010
  VCP – 0.014
- Sewer segments where material is unknown was assumed to be VCP
- No other losses in the system were included
- The model was run at steady state, with each lift station operating in simplex mode
- Additional steady state scenarios were included in the hydraulic model with each lift station individually operating in duplex mode.

7.3 Total System Flows

The results of the hydraulic model for the existing wastewater collection system yielded a peak inflow to the wastewater treatment facility of 3,965 GPM, or 5.71 MGD. This is in excess of the peak hour flow of 5.24 MGD described in Section 4.2, as it includes both Lift Stations No. 3 and No. 5 operating in simplex mode, and wastewater stored in the wetwell of the lift stations is being discharged into the collection system.

Similarly, the results of the hydraulic model for the future condition wastewater collection system yielded an identical peak inflow to the wastewater treatment facility, as both Lift Stations No. 3 and No. 5 would be operating in simplex mode. In the future, it is anticipated higher capacity pumps will be installed at Lift Stations No. 3 and No. 5, which will increase the peak inflow to the wastewater treatment facility.

7.4 Lift Station Flows

The peak inflow to each of the lift stations as shown in the hydraulic model for the wastewater collection system is shown in **Table 7-1**.

Table 7-1: Lift Station Inflows		
	Peak Inflow (GPM)	
Lift Station	Existing Condition	Future Condition
Lift Station 2	457	565
Lift Station 3	1,150	1,325
Lift Station 4	26	26
Lift Station 5	3,136	3,358
Lift Station 6	866	866
Lift Station 7	11	11
Lift Station 9	24	24
Lift Station 11	24	24
Lift Station 13	795	1,111

7.5 Collection System Hydraulic Deficiencies – Existing Condition

The hydraulic model was used to determine where the gravity collection system is hydraulically deficient during existing peak hour flow rates. Pipes flowing with a depth to diameter ratio (d/D) of 0.75 or greater during peak hour flows were determined to be over capacity and therefore hydraulically deficient.

The pipe segments found to be hydraulically deficient are shown graphically and labeled in Appendix F. A table showing the details of each hydraulically deficient pipe segment in the existing condition during peak hour flows, including the recommended upgraded pipe size is included in Appendix G.

7.6 Collection System Model Results Future Condition

The hydraulic model was used to determine where the gravity collection system is hydraulically deficient during future peak hour flow conditions. Similar to Section 7.5, the pipe segments found to be hydraulically deficient are shown graphically and labeled in Appendix F. A table showing the details of each pipe segment which is hydraulically deficient in the future condition including the recommended upgraded pipe size is included in Appendix G; pipe segments identified as deficient in the existing condition in which flow did not increase in the future condition were omitted. Pipe segments not hydraulically deficient in the existing condition, but deficient in the future condition are shown in bold.

7.7 Lift Station No. 2 Abandonment

As discussed in Section 3.6.1, the City is considering abandoning Lift Station No. 2. In addition to the improvements required to convert Lift Station No. 2 to gravity flow, the hydraulic model indicates the majority of the pipe segments downstream of Lift Station No. 2 would become hydraulically deficient if this conversion were to occur. The pipe segments found to be hydraulically deficient are shown graphically and labeled in Appendix F. A table showing the details of each pipe segment which would be hydraulically deficient if the abandonment of Lift Station No. 2 were to occur is included in Appendix G.

Based on the anticipated costs to upsize piping downstream of the Lift Station No. 2 abandonment, it is assumed the station will be replaced, rather than abandoned.

7.8 Eagle Ranch Development

An evaluation of the hydraulic impacts of the Eagle Ranch Development was conducted, utilizing the flows developed in **Table 4.8** and discharging into manhole SAS44 as proposed by the Development. With the additional flows from the Development, no additional segments would be deficient in accordance with the criteria described in Section 7.6.

MNS recommends the Development discharge to manhole SAS34 on El Camino Real, to avoid impacting the residential area near manhole SAS44, and to connect to a manhole with a larger diameter discharge.

7.9 Lift Station No. 5 Rehabilitation/Replacement

See Section 3.5.2 for recommendations on the rehabilitation/replacement of Lift Station No. 5.

7.10 Lift Station No. 13 Forcemain Realignment

As discussed in Section 3.6.3, the City is considering modifying the forcemain for Lift Station No. 13 to reduce odors and reduce the required discharge pressure at the lift station. These modifications would also increase the pumping capacity of this lift station utilizing the existing pumps.

The proposed modification would abandon the final 1,600 linear feet of the existing forcemain and extend the forcemain along an alternate route. Starting at the intersection of Del Rio Road and Chico Road, the new portion of the forcemain would extend approximately 900 linear feet northeast on Chico Road to the intersection of Chico Road and Traffic Way, then approximately 1,800 linear feet to the southeast on Traffic Way to an existing manhole approximately 575 feet west of the intersection of Traffic Way and Orillas Way. This existing manhole has an invert elevation of 863.02.

The discharge of the existing forcemain is at an elevation of 912.62 feet. The discharge elevation would be approximately 50 feet below the existing discharge elevation, reducing the required discharge pressure at the lift station. This would, however, extend the total length of the forcemain by approximately 1,100 feet from 11,525 feet to approximately 12,625 feet. This increase in length would increase the discharge pressures at Lift Station No. 13 due to a reduction in friction losses in the pipeline. The realigned portion of the forcemain should be constructed of 8-inch diameter pipe to reduce friction losses in the forcemain.

If this realignment is implemented, additional measures could be implemented to minimize odors from the new transition manhole on Traffic Way. These measures could include a sealed manhole cover, or the installation of a Vortex Flow Insert in the transition manhole.

These changes would result in a net decrease in discharge pressure at the lift station to achieve the same flow rate as the existing condition. Utilizing the existing pumps with this modification would result in an increase in lift station discharge flow rate.

In addition to the modifications to the forcemain, an additional hydraulic benefit would be realized if the City increases the size of discharge piping between the pumps and the forcemain at Lift Station No. 13. The existing discharge piping diameter is 3-inch, resulting in high friction losses in the small diameter pipe due to fluid velocities in excess of 12 feet per second. MNS recommends that the discharge piping be enlarged to 6-inch diameter piping.

A pump and system curve modeling the pumping condition for the realigned forcemain, as well as enlarging the discharge piping at the lift station is included in Appendix H. With the existing pumps, the simplex operating point is anticipated to be 355 GPM at a discharge pressure of 175 feet of head.

The City may consider replacing the existing vertical turbine pumps at Lift Station No. 13 with submersible pumps in accordance with City standards. If the pumps are replaced in conjunction with these forcemain modifications, pumps should be installed for the revised hydraulic conditions and anticipated future design flows.

SECTION 8 Capital Improvement Projects

A series of capital improvement projects have been developed to upgrade the wastewater collection system to meet existing and future requirements, reduce operation and maintenance expense, and preserve the City's investment in the collection system infrastructure.

8.1 Basis of Costs

Costs for replacing/Installing portions of the gravity sewer collection system are based on the unit costs shown in **Table 8-1**.

Table 8-1: Gravity Sewer Replacement Costs

Pipe Size	Open Cut Replacement Cost ($/LF) [1]
8	$150
10	$175
12	$195
15	$220
18	$240
21	$270
24	$300
27	$330
36	$400

[1] Costs for gravity sewer replacements are in 2015 dollars.

Costs for other improvements, including forcemain modifications and lift station improvements have been based on the Engineer's experience, recent bid results, and other engineering studies as indicated.

All capital improvement costs have been escalated by 30 percent to allow for construction cost contingencies, and a further 30 percent to account for costs associated with engineering and administration. All budgetary project costs have been rounded to the nearest $1,000.

8.2 Project Prioritization

Each capital improvement project was assigned a priority of 1, 2, or 3. These priorities correspond to the following:

Priority 1 Projects: These projects address immediate issues, including projects which may cause sanitary sewer overflows due to insufficient capacity in the existing condition, will repair failed infrastructure, or address existing safety issues. These projects should be implemented as quickly as possible.

Priority 2 Projects: These projects address future capacity and condition issues, including projects which will increase system capacity to meet future demands or repair deteriorating infrastructure. Repair projects should be implemented within the next 5 years, and implementation of capacity projects should be triggered by development approvals.

Priority 3 Projects: These projects upgrade existing infrastructure to simplify or minimize operation and maintenance for City staff, and preserve the longevity of the City's assets. These projects should be implemented within the next 10 years.

8.3 Lift Station Capital Improvements

Improvement projects have been developed to address the capacity and condition issues identified at the City's active lift stations. A map showing the locations of each project is included as Appendix I. Projects to address existing issues are summarized in **Table 8-2**. No issues occurring only in the future condition were identified.

Table 8-2: Capital Improvements for Lift Station Based on Existing Flow Conditions					
Project	**Project Name**	**Deficiency**	**Capital Improvement Project (CIP)**	**Priority**	**Opinion of Cost ($)**
EWWLSCIP-1	Lift Station No. 1 Site Improvements	Site access issues, drainage issues, pavement degradation, potential to remove corroded surge tank	Site improvements and remove or recoat surge tank	2	$118,000
EWWLSCIP-2	Replace Lift Station No. 2	Lift station is past its useful life	Abandon existing lift station and convert to gravity flow, including upsizing of downstream hydraulically deficient gravity sewers	1	$880,000
EWWLSCIP-3	Lift Station 3 Site Improvements	Failing retaining wall, challenging working environment	Replace retaining wall, new concrete slab, valve vault improvements	3	$75,000
EWWLSCIP-4	Lift Station 4 Site Improvements	Wetwell open to valve vault, coating on lids and piping are failing	Repair wetwell, recoat vault lid and piping	2	$24,000
EWWLSCIP-5	Lift Station 5 Upgrades	Lift station at end of useful life, high risk of forcemain failure[1]	Replace Lift Station No. 5 and associated forcemain	2	$6,230,000
EWWLSCIP-6	Lift Station 6 Site Improvements and Pump Upgrades	In the existing condition, peak flows exceed pump capacity in simplex operation, also, operations requests simplified site access and improved site safety	Miscellaneous site improvements and capacity improvements	1	$71,000
EWWLSCIP-7	Lift Station 7 Abandonment & Gravity Conversion	Lift station is suitable for abandonment to avoid future operation and maintenance issues	Abandon existing lift station and install new gravity sewer	2	$184,000
EWWLSCIP-8	Lift Station 9 Site Improvements	Pump shed doors pose a potential safety hazard	Modify shed to eliminate doors	3	$7,000
EWWLSCIP-9	Lift Station 11 Improvements	Lift station is near high speed traffic, and the condition of some items is degrading	Above grade pump bypass to reduce traffic disruptions during bypassing, and other misc. improvements	3	$63,000

Capital Improvements for Lift Station Deficiencies Based on Existing Flow Conditions					
EWWLSCIP-10	Lift Station 13 Forcemain Modifications	Odor complaints near current forcemain discharge point and high head on existing pumps	Modify forcemain realignment, increase discharge piping size, recoat or remove surge tank, electrical improvements, electrical and misc. site improvements.	1	$856,000
EWWLSCIP-11	Lift Station 14 Site Improvements and Electrical Upgrades	Electrical issues, tripping hazards, and other misc. issues	Modify site concrete, electrical improvements, and other misc. improvements	2	$60,000
EWWLSCIP-12	Lift Station 15 Safety Improvements	Miscellaneous site issues	Miscellaneous site improvements	3	$3,000
				Priority 1 Subtotal	$1,736,000
				Priority 2 Subtotal	$6,616,000
				Priority 3 Subtotal	$155,000
				Total	**$8,507,000**

[1] Note: Lift station 5 has sufficient capacity to meet existing hydraulic capacity. Due to its deteriorating condition, it is included in this table as an existing deficiency.

Detailed cost estimates for lift station capital improvement projects are included in Appendix J Installation of local water services at each lift station are not included where new connections to the potable water system distribution system would be required, due to the high connection fee.

8.4 Collection System Capital Improvements

Capital improvement projects have been developed to address the capacity and condition issues identified in the City's gravity sewer collection system. These projects are summarized in **Table 8-3**. A map showing the locations of each project is included as Appendix I. In areas where an increase in pipe size is required to increase capacity to meet existing and future demands, an increase in downstream pipe segments which were below the enlarged pipe diameter were also included in the project to avoid transitions from larger to smaller diameter pipes at the request of the City.

Capital improvement projects to correct hydraulic deficiencies were grouped into projects based on location. Hydraulic deficiencies in one area were included in the same project to avoid disrupting an area multiple times and to simplify bypassing operations.

Table 8-3: Capital Improvements for Gravity Collection System Deficiencies Based on Existing Flow Conditions							
Project	**Project Name**	**Existing Facility**	**Deficiency**	**Capital Improvement Project (CIP)**	**Notes**	**Priority**	**Opinion of Cost ($)**
EWWCSCIP-1	Traffic Way Sewer Improvements	4266 LF 8" Gravity Sewer 2284 LF 10" Gravity Sewer 2374 LF 12" Gravity Sewer 483 LF 18" Gravity Sewer	Peak Flows in Existing Sewers Exceed Capacity of System	3824 LF 15" Gravity Sewer 1460 LF 18" Gravity Sewer		1	$1,750,000
EWWCSCIP-2	Highway 41 and El Camino Real Sewer Improvements	511 LF 8" Gravity Sewer 1,216 LF 10" Gravity Sewer 1,774 LF 15" Gravity Sewer	Peak Flows in Existing Sewers Exceed Capacity of System	144 LF 10" Gravity Sewer 1,216 LF 12" Gravity Sewer 2,141 LF 18" Gravity Sewer	Includes a $35,000 allowance for traffic control and an encroachment permit for work within Caltrans Right-of-Way	1	$1,300,000
EWWCSCIP-3	Various Locations Sewer Condition Improvements	55,629 LF of gravity sewer mains identified with condition issues during video survey	Condition Issues in Gravity Collection Mains	Repair/Replace 20% of identified 55,629 LF in 5-Year CIP (11126 LF)		2	$2,670,000
EWWCSCIP-4	Asset Management Program	Gravity Collection System		Program to Manage Wastewater Collection System		1	$75,000
EWWCSCIP-5	Inflow and Infiltration Study	Gravity Collection System	Inflow and Infiltration in the Collection System	Study to Evaluate and Recommend Strategies to Control Inflow and Infiltration		1	$50,000
						Priority 1 Subtotal	$1,425,000
						Priority 2 Subtotal	$2,670,000
						Priority 3 Subtotal	$0
						Total	**$4,095,000**

8.5 Capital Improvement Summary

A summary of recommended capital improvement projects is included in **Table 8-4**.

Table 8-4: Collection System Capital Improvement Summary	
Capital Improvements for Existing Lift Station Deficiencies	$8,571,000
Capital Improvements for Gravity Collection System	$4,095,000
Total	**$12,666,000**
Total Priority 1 Budget	$3,232,000
Total Priority 2 Budget	$9,286,000
Total Priority 3 Budget	$148,000
Total	**$12,666,000**

8.6 Repair and Replacement Reserves

As with any major infrastructure system, ongoing work is required to maintain the system is good working order. It is certain that future upgrades to the collection system will be required, which are not accounted for in this study. The City should establish a wastewater collection system repair and replacement reserve to set aside funds for these future needs. These reserves should be incorporated into the City's budgeting process and future rate studies.

Determining the amount of reserves which should be set aside could be determined in several ways, including, but not limited to the following:

- Assume a percentage of the collection system will need to be replaced each year. Replacing 2% of the collection system, which would result in an asset life of 50 years, would be a typical strategy for this method.
- Develop a total valuation of the collection system, and then divide the total value of the system by the anticipated lifespan of the collection system, i.e. 75 years.
- Assume the annual expenditures will be equal to the annual depreciation of all collection system assets.

The first step is development of an asset management program to determine the baseline condition and value of collection system components. A budget for the development of an initial asset management program is included in the capital improvement program.

8.7 Conclusions

Based on this study, the City should incorporate the capital improvement projects in their budgeting process and future rate studies to ensure adequate funds are available to complete these projects. In addition, the City should immediately begin the planning phases for Priority 1 capital improvement projects, such that construction can commence as soon as funds are available.

SECTION 9 Staffing Evaluation

The goal of the staffing evaluation was to compare operation staffing levels of other local, similarly sized wastewater agencies to determine appropriate staffing levels for the City of Atascadero's wastewater operations. Other agencies evaluated included the City of Paso Robles, the Laguna Sanitation District, and the Nipomo Community Services District. A summary of the size of each of these agencies is included in **Table 9-1**.

Table 9-1: Agency Size Comparison

Agency / Parameter	City of Atascadero	City of Paso Robles	Laguna Sanitation District	Nipomo Community Service District
Approximate System Connections	5,000	30,000 (Residents Served)	11,700	3,500
Average Daily Flow (MGD)	1.38	2.6	2.4	0.6 + 0.06 (Two Treatment Plants)
Lift Stations	12	14	1	13
Miles of Collection System Mains	70	141	128	100
Wastewater General Manager/Supervisor	1	1	1	1
Operations Supervisors	1	2[1]	1	1
Operation and Maintenance Staff	5	9	12	8[2]
Total Operations Staff[3]	6	11	13	9

[1]During a phone interview, the City of Paso Robles indicated they are understaffed, and an additional operation supervisor would be needed for adequate staffing levels. This position is assumed to exist.
[2]Nipomo CSD utilizes the same operators for wastewater collection system operation and water system distribution system operation. Operators used in this manner were counted as 0.5 operators.
[3]Positions currently vacant, but planned to be filled were assumed to exist.

The conceptual strategy for evaluating staffing is to compare the total number of operations staff for each agency divided by each system size parameter, including system connections, average daily flow, number of lift stations, and miles of collection mains, giving a set of "operation staffing factors". Each of these four factors is equally weighted. An average of these factors was then multiplied by the same criteria for the City, and then averaged. The calculation of the staffing factors is shown in **Table 9.2.**

Table 9-2: Operation Staffing Factors

Agency / Operation Staffing Factor	City of Paso Robles	Laguna Sanitation District	Nipomo Community Service District	Average Staffing Factor
Operators Per System Connection/Customer	0.0010[1]	0.0011	0.0026	0.0016
Operators Per MGD of Average Daily Flow	4.23	5.42	13.64	7.76
Operators per Lift Station	0.79	13[2]	0.69	0.74
Operators per Mile of Collection System Main	0.078	0.101	0.090	0.089

[1]The number of residents served was divided by the average residents per household (2.73) as documented in the 2010 US census to determine the number of connections.
[2]Due to the low number of lift stations in the Laguna Sanitary District, this data point is considered an outlier, and was omitted from the analysis

The calculation of the recommended staffing levels is shown in **Table 9.3**.

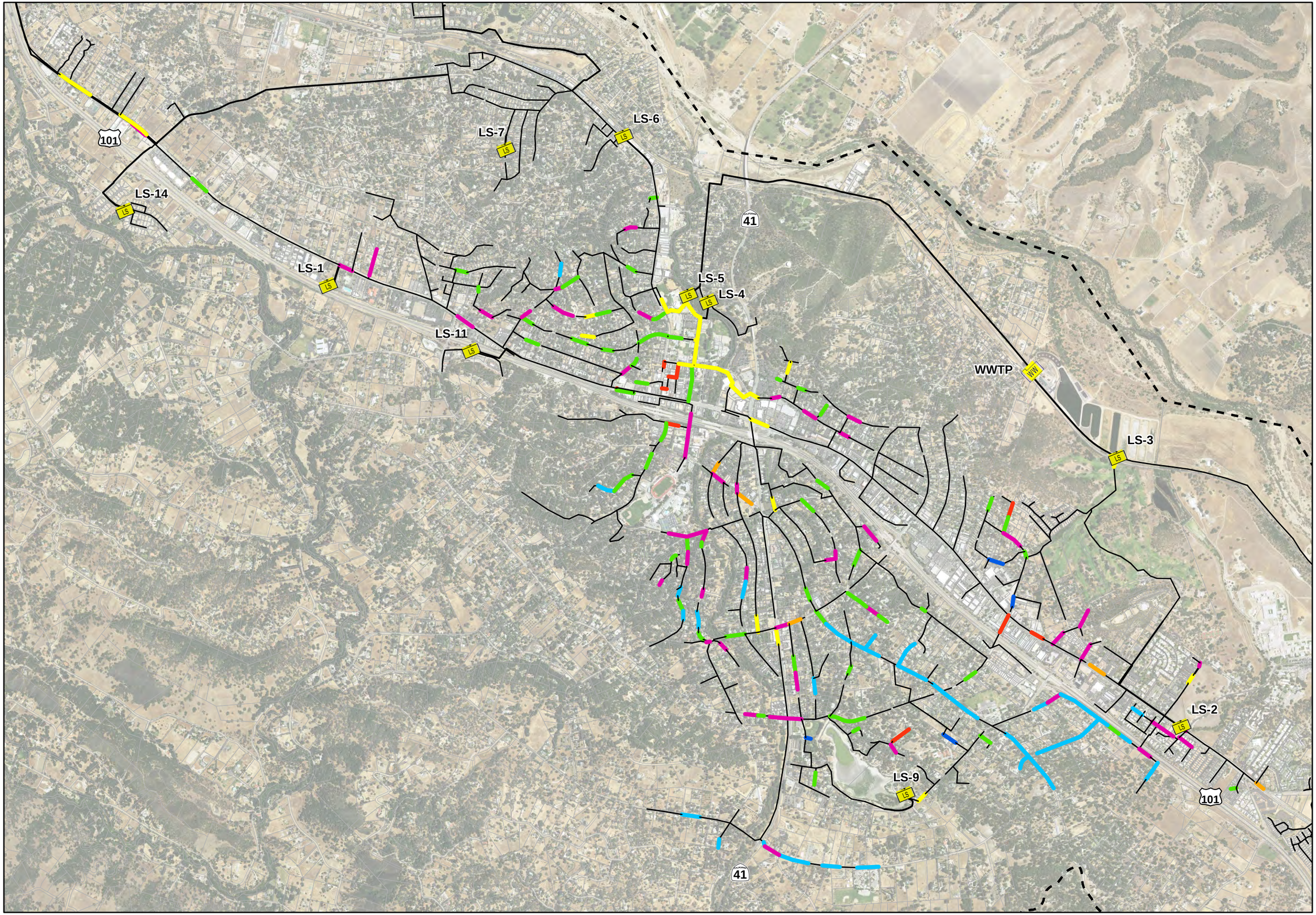
Table 9-3: Calculated Atascadero Staffing Calculations			
Parameter	**Average Operation Staffing Factor**	**Atascadero System Parameter**	**Recommended Staff Based on Operation Staffing Factor**
Approximate System Connections/Customers	0.0016	5,000	7.8
Average Daily Flow (MGD)	7.76	1.38	10.7
Lift Stations	0.74	12	8.9
Miles of Collection System Mains	0.089	70.1	6.3
		Average	**8.4**

Based on this analysis, the City's wastewater operation staff should include 8.4 FTE staff members, or 8 full time, and one part time operator to be adequately staffed. The City currently has 6 operators on staff, including an operations manager. The City should add two additional full time operations staff, and one part time operations staff to reach adequate staffing levels.

In addition, the City should consider establishing a collection system supervisor and a treatment system supervisor within the recommended 8 full time positions discussed herein. This would help distribute managerial effort among multiple staff.

APPENDIX A

Gravity Collection Sewer System Defect Map



Wastewater Collection System Master Plan Update

Appendix A

Gravity Pipe Defect Map

Legend

- Lift Station
- WWTP
- Collection System

Pipe Defect

- Cracks
- Debris
- Defective Taps
- Infiltration
- Joint Offset
- Roots
- Unpassable
- City Parcels
- City Limits

Scale: NTS

APPENDIX B

Update to 2006 Lift Station 5 Site Alternatives Study

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Arroyo Grande, CA 93421
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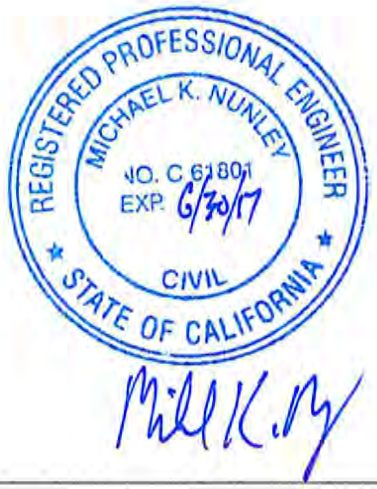
Technical Memorandum



To: Justin Black
Public Works Operations Manager
City of Atascadero

From: Robert Lepore, GISP
Michael K. Nunley, PE

Date: September 9, 2015

Re: Update to 2006 Lift Station 5 Site Alternatives Study

INTRODUCTION

Michael K. Nunley & Associates (MKN) was retained by the City of Atascadero to update the findings from the "Lift Station Alternatives Study" dated October 2006 and prepared by Cannon Associates. MKN's study evaluated two additional sites for replacement of Lift Station 5. The scope of services for this project included the following tasks:

- ❑ Prepare a site map using the City's GIS system, showing previous and new site options
- ❑ Develop a comparative analysis of four (4) sites (top two sites from the original Lift Station Alternatives Study and two additional sites from this study) based on the following criteria:
  - Available space
  - Constructability
  - Construction cost
  - Flexibility to serve future customers
  - Visibility
- ❑ Develop an updated conceptual project cost for the preferred alternative

OVERVIEW

The City of Atascadero analyzed five potential sites for replacement of Lift Station 5 in the 2006 Lift Station Alternatives Study (Alternatives Study). The City is in the process of completing an update to the Wastewater Collection System Master Plan (Master Plan) and has incorporated the findings from the Alternatives Study into the Capital Improvement Plan section of the Master Plan.

However, through recent discussions with City staff, several challenges have been identified with the two favorable sites initially proposed in the Alternatives Study. These challenges include visual impacts of the new lift station facility to neighboring residents, availability of public rights of way and requirements for easements from property owners. Locations of the proposed Lift Station 5 alternatives from the Alternatives Study and two additional sites identified during a field visit with City staff are shown in **Figure 1** included as Attachment A.

EXISTING AND FUTURE WASTEWATER FLOWS

The existing Lift Station 5 is a 2+1 configuration with two pumps to serve peak flow conditions and one for redundancy. Based on the Master Plan, existing peak hour inflow to Lift Station 5 was estimated to be 2,800 gpm and future peak hour flow was estimated to be 3,500 gpm. The pumps are sized to deliver 2,325 gpm during simplex operation and 3,050 gpm during duplex operation. Based on the hydraulic evaluation completed for the Master Plan, it appears that the lift station can handle existing peak flows in duplex operation, but is not sufficient for future peak flows unless the third pump is in operation.

EXISTING LIFT STATION 5 SITE CONDITIONS

The following summarizes the maintenance issues observed during the development of the Master Plan with respect to the existing equipment at the Lift Station 5 site:

- Sulfide corrosion and odors were noted
- Scum and grit build up are common problems and pumps need frequent servicing due to ragging
- The interior coating of the wet well is starting to fail
- There are no locks on wet well access hatches
- There is significant corrosion on the discharge piping in the wet well
- Discharge piping on the exterior of the wet well is a combination of materials exhibiting various stages of corrosion
- The surge tank at this location is showing significant corrosion
- The emergency generator operates on natural gas, and there is no storage on site. In the event of a power and natural gas outage, there will be no back-up power at this facility
- The lift station is equipped with a dirt-lined overflow basin
- The force main for this lift station is AC pipe, and is approximately 40 years old. City staff is concerned that the pipe has outlasted its design life.

SITE OPTIONS

In the Alternatives Study five potential lift station sites were evaluated, however only two sites (Options 1 and 2) were selected for further evaluation and potential design. These two sites and two additional sites (Options 6 and 7) evaluated by MKN as part of this study are described below:

Option 1:

Located near intersection of Ensenada and Via Avenue. A new gravity main from the existing system would run along Ensenada to the lift station. Preliminary analysis and the Master Plan cited that there were numerous benefits to locating the lift station near the intersection of Ensenada and Via Avenue including the potential to serve new customers from a future connection to the Ensenada and Capistrano neighborhood.

Option 2:

Located near intersection of Ensenada and Via Avenue. Same location as Option 1, but the new gravity main would traverse Capistrano Avenue, turn onto Cabrillo, then turn onto Ensenada. As noted for Option 1, preliminary analysis and the Master Plan cited that there were numerous benefits to locating the lift station near the intersection of Ensenada and Via Avenue including the potential to serve new customers from a future connection of the Ensenada and Capistrano neighborhood.

Option 6:

Located near intersection of Capistrano and Sycamore Road to the north of the train tracks. Option 6 could be sited in the public right-of-way, but would require significant earthwork at that location. Traffic control during construction of the

new main will also be a concern at the underpass. However, this site would have minimal visual impact and opens the possibility to serve future customers from the neighborhoods north of the train track.

Option 7:

Located on the UPRR property to the south of the train tracks. While this option provides a large amount of area for the lift station facility it has been eliminated from consideration due to complexities of obtaining an easement from UPRR.

After review of the previously preferred and new additional site options (1, 2, 6, and 7) for this study, the City has decided it would be preferable to rehabilitate or construct a new lift station facility at the current Lift Station 5 site and also replace the existing 16-inch force main from the lift station to the WWTP facility.

New Option: Replace or Rehabilitate at the Existing Lift Station 5 Site:

As proposed by City staff, the least expensive option is to rehabilitate or replace Lift Station 5 adjacent to the existing site. This would require the least disruption to the existing sewer collection system. Project components would include the lift station components (new or rehabilitated wet well, piping, electrical, controls, instrumentation, and pumps), new force main, but minimal gravity sewer construction. In addition, the emergency overflow basin (adjacent to Lift Station 5) would still be available in the event of a lift station failure. The force main across Atascadero Creek was replaced within the last 10 years with a PVC main, so that section would not require additional work.

The following matrix summarizes observations for Options 1, 2, 6, and 7 based on the evaluation criteria stated in the Introduction section of this memorandum. Comments relevant to construction cost for each option, compared with a new or rehabilitated Lift Station 5 at the existing site, are also provided:

Table 1: Site Comparisons

Site Options	1	2	6	7
Location	Ensenada and Via	Ensenada and Via	Capistrano and Sycamore	UPRR
Visibility from Nearby Residences	Highly visible	Highly visible	Least visible	Low visibility
Flexibility to Serve Future Customers	Yes	Yes	Yes	Most flexibility due to low ground elevation
Space	Limited due to proximity to creek	Limited due to proximity to creek	Right of way is available	Could be a fatal flaw - UPRR not likely to grant an easement for above-ground facility (ex. panels and generator)
Constructability	Space is a concern	Space is a concern	Requires most earthwork and retaining walls, along with traffic control to allow access through the railroad underpass.	Flat site with minimal constructability issues other than easement concerns
Construction Cost	Realigning the gravity sewer system will be expensive relative to rehabilitating or replacing adjacent to existing LS 5 site	Same comment as Option 1	Same comment as Option 1. Could be the most expensive site due to earthwork.	Same comment as Option 1. Second most expensive site due to length of gravity sewer realignment.

CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the City proceed with the development of a preliminary design report (PDR) to rehabilitate or replace Lift Station 5 in the current location. The PDR would address major issues such as phasing of improvements to serve existing and future flow conditions, viability of rehabilitating the current lift station, bypass requirements during construction, force main replacement and alignment, condition of existing building and other site repairs.

Table 2 provides a conceptual cost for a new lift station facility, since the most conservative assumption for budget development is a full replacement of the existing lift station. This opinion of probable construction cost represents judgment as a design professional and is supplied for the general guidance of the City. Since MKN has no control over the cost of labor and materials, MKN does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost to the City.

Table 2: Lift Station 5 Conceptual Project Cost

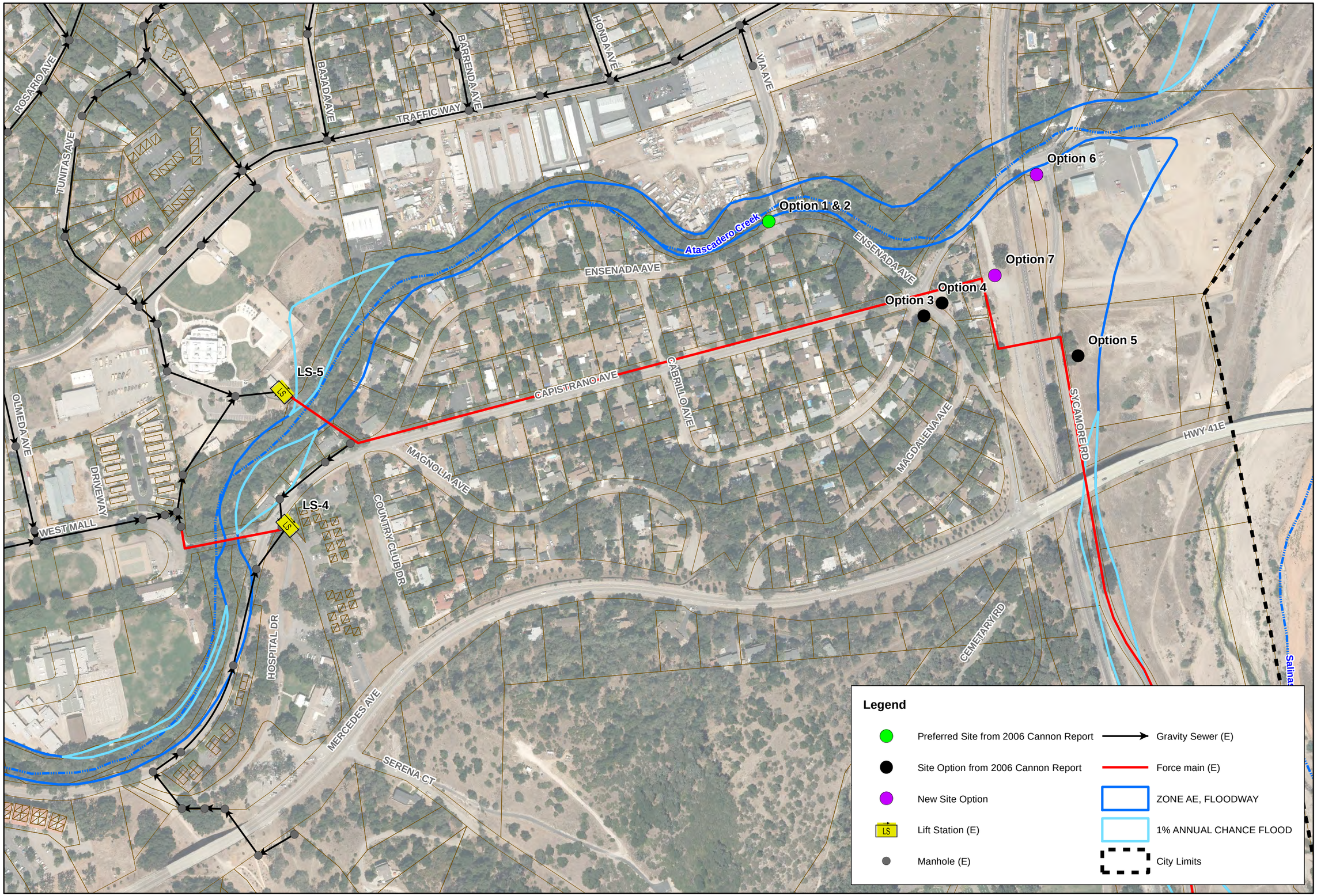
Item	Component	Quantity	Unit	Unit Price	Amount
1	New Lift Station - Civil Structural and Mechanical	1	LS	$800,000	$800,000
2	Emergency Generator	1	LS	$150,000	$150,000
3	Electrical, Controls and Instrumentation	1	LS	$200,000	$200,000
4	Piping Modification Allowance	1	LS	$50,000	$50,000
5	Temporary Bypass Allowance	1	LS	$50,000	$50,000
6	Force Main	12000	LF	$200	$2,400,000
7	UPRR Jack and Bore	300	LF	$800	$240,000
				Subtotal	$3,890,000
	Engineering, Project Administration and Construction Management		30%		$1,167,000
	Construction Contingency		30%		$1,167,000
	Subtotal				$2,334,000
				Total (Rounded)	**$6,230,000**

ATTACHMENT A

Update to 2006 Lift Station 5 Site Alternatives Study

Figure 1:

Lift Station 5 Site Options

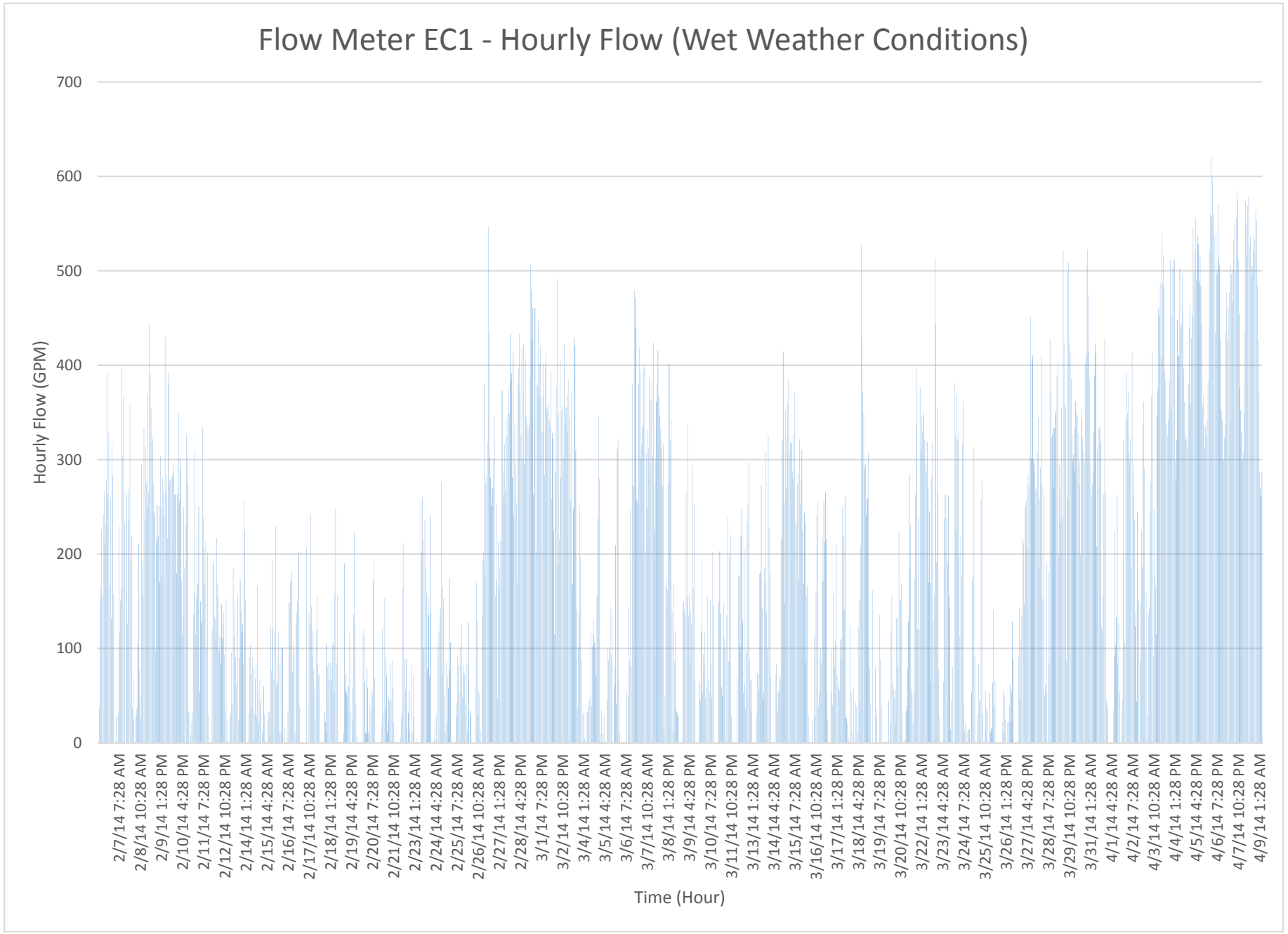


1 inch = 300 feet

0 150 300

APPENDIX C

Flow Monitoring Results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Hourly Flow (GPM)
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600
500
400
300
200
100
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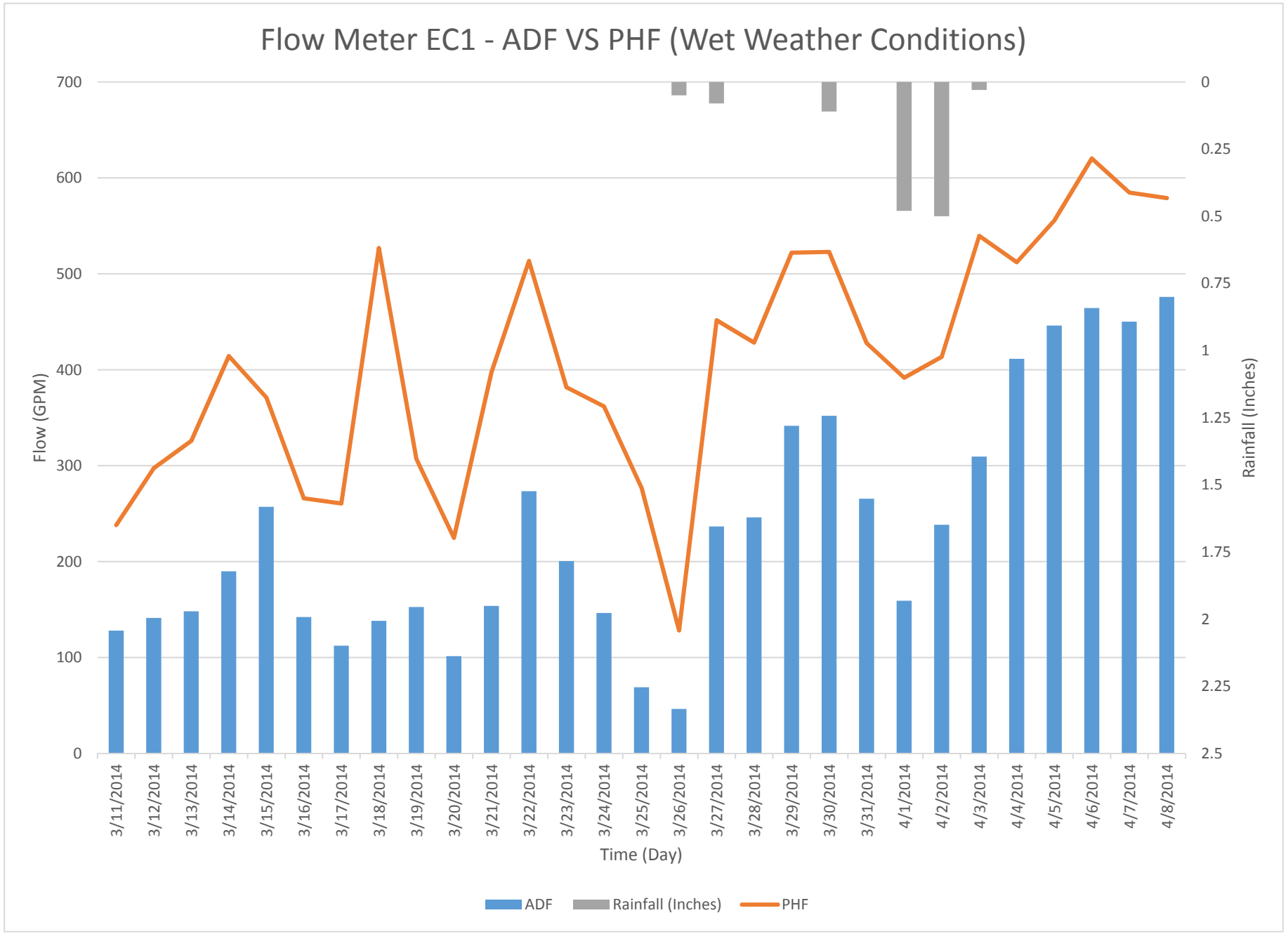
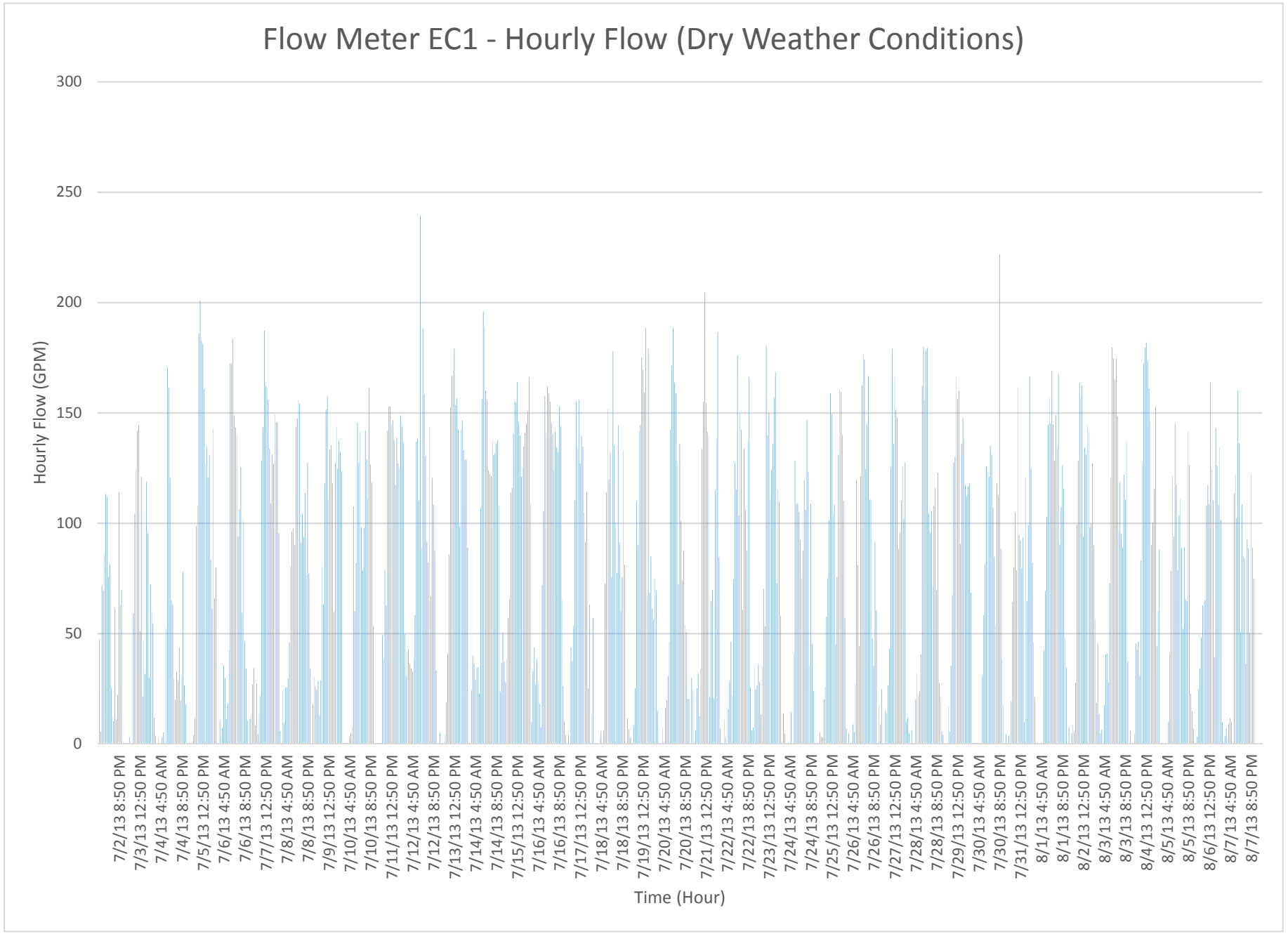
3/18/14 4:28 PM
3/19/14 7:28 PM
3/20/14 10:28 PM
3/22/14 1:28 AM
3/23/14 4:28 AM
3/24/14 7:28 AM
3/25/14 10:28 AM
3/26/14 1:28 PM
3/27/14 4:28 PM
3/28/14 7:28 PM
3/29/14 10:28 PM
3/31/14 1:28 AM
4/1/14 4:28 AM
4/2/14 7:28 AM
4/3/14 10:28 AM
4/4/14 1:28 PM
4/5/14 4:28 PM
4/6/14 7:28 PM
4/7/14 10:28 PM
4/9/14 1:28 AM
Time (Hour)


Flow Meter EC1 - ADF VS PHF (Wet Weather Conditions)
Flow (GPM)
Rainfall (Inches)
Time (Day)
700
600
500
400
300
200
100
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
3/11/2014
3/12/2014
3/13/2014
3/14/2014
3/15/2014
3/16/2014
3/17/2014
3/18/2014
3/19/2014
3/20/2014
3/21/2014
3/22/2014
3/23/2014
3/24/2014
3/25/2014
3/26/2014
3/27/2014
3/28/2014
3/29/2014
3/30/2014
3/31/2014
4/1/2014
4/2/2014
4/3/2014
4/4/2014
4/5/2014
4/6/2014
4/7/2014
4/8/2014
ADF
Rainfall (Inches)
PHF


Flow Meter EC1 - Hourly Flow (Dry Weather Conditions)
Hourly Flow (GPM)
300
250
200
150
100
50
0
7/2/13 8:50 PM
7/3/13 12:50 PM
7/4/13 4:50 AM
7/4/13 8:50 PM
7/5/13 12:50 PM
7/6/13 4:50 AM
7/6/13 8:50 PM
7/7/13 12:50 PM
7/8/13 4:50 AM
7/8/13 8:50 PM
7/9/13 12:50 PM
7/10/13 4:50 AM
7/10/13 8:50 PM
7/11/13 12:50 PM
7/12/13 4:50 AM
7/12/13 8:50 PM
7/13/13 12:50 PM
7/14/13 4:50 AM
7/14/13 8:50 PM
7/15/13 12:50 PM
7/16/13 4:50 AM
7/16/13 8:50 PM
7/17/13 12:50 PM
7/18/13 4:50 AM
7/18/13 8:50 PM
7/19/13 12:50 PM
7/20/13 4:50 AM
7/20/13 8:50 PM
7/21/13 12:50 PM
7/22/13 4:50 AM
7/22/13 8:50 PM
7/23/13 12:50 PM
7/24/13 4:50 AM
7/24/13 8:50 PM
7/25/13 12:50 PM
7/26/13 4:50 AM
7/26/13 8:50 PM
7/27/13 12:50 PM
7/28/13 4:50 AM
7/28/13 8:50 PM
7/29/13 12:50 PM
7/30/13 4:50 AM
7/30/13 8:50 PM
7/31/13 12:50 PM
8/1/13 4:50 AM
8/1/13 8:50 PM
8/2/13 12:50 PM
8/3/13 4:50 AM
8/3/13 8:50 PM
8/4/13 12:50 PM
8/5/13 4:50 AM
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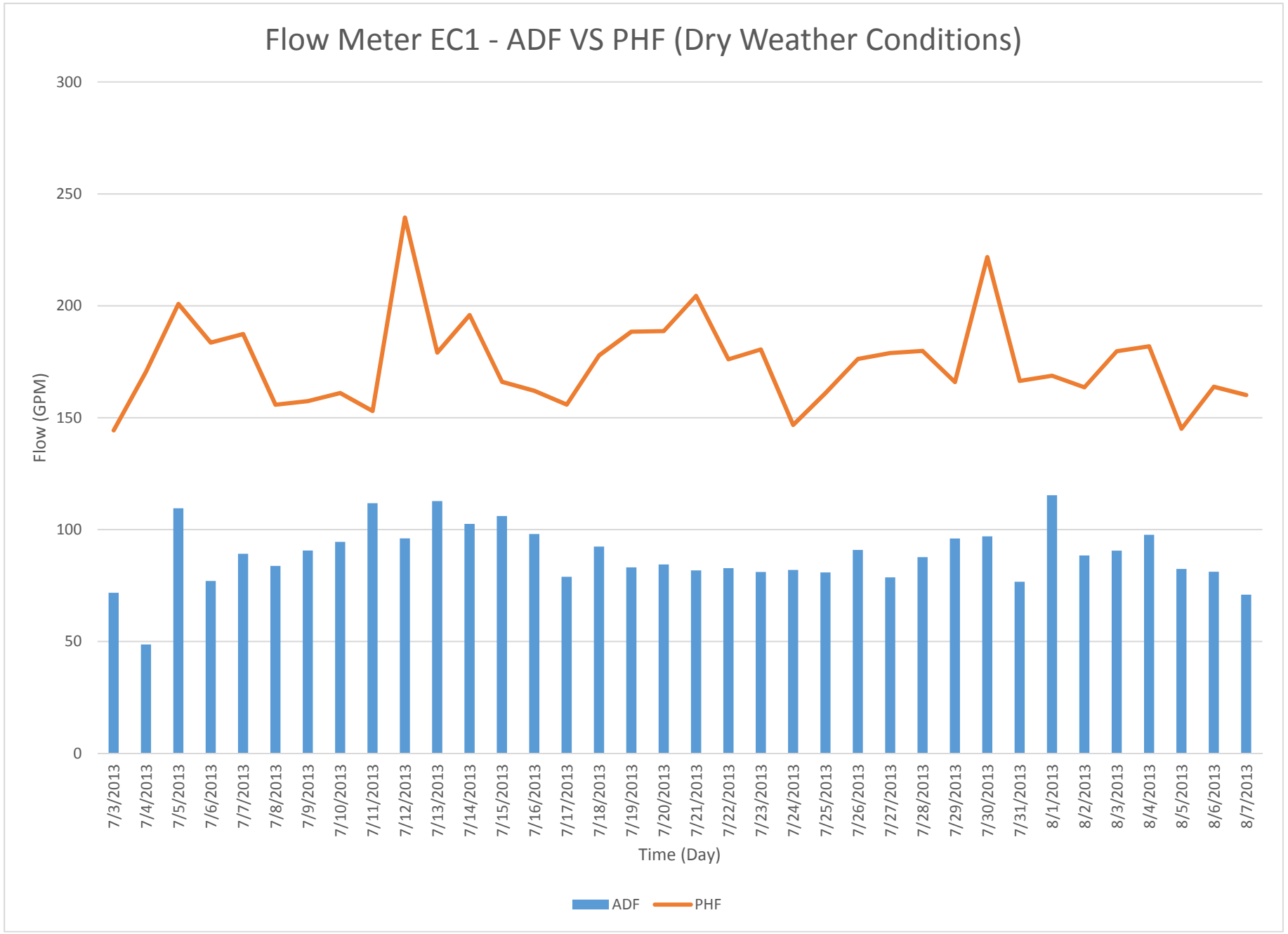
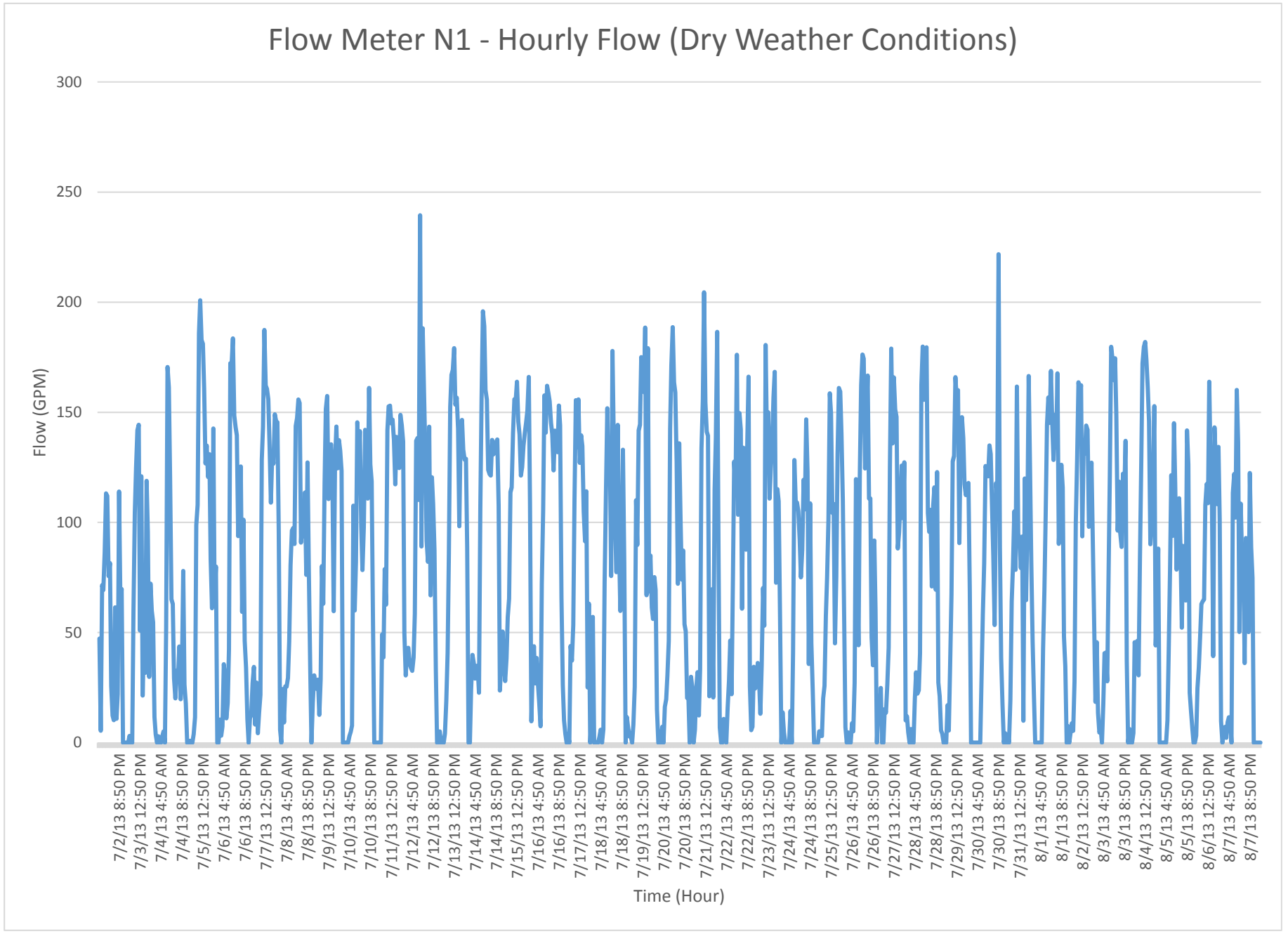
8/7/13 4:50 AM
8/7/13 8:50 PM
Time (Hour)


Flow Meter EC1 - ADF VS PHF (Dry Weather Conditions)
300
250
200
150
100
50
0
Flow (GPM)
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
7/28/2013
7/29/2013
7/30/2013
7/31/2013
8/1/2013
8/2/2013
8/3/2013
8/4/2013
8/5/2013
8/6/2013
8/7/2013
Time (Day)
ADF
PHF


Flow Meter N1 - Hourly Flow (Dry Weather Conditions)
Flow (GPM)
300
250
200
150
100
50
0
7/2/13 8:50 PM
7/3/13 12:50 PM
7/4/13 4:50 AM
7/4/13 8:50 PM
7/5/13 12:50 PM
7/6/13 4:50 AM
7/6/13 8:50 PM
7/7/13 12:50 PM
7/8/13 4:50 AM
7/8/13 8:50 PM
7/9/13 12:50 PM
7/10/13 4:50 AM
7/10/13 8:50 PM
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7/12/13 4:50 AM
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7/20/13 4:50 AM
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8/3/13 8:50 PM
8/4/13 12:50 PM
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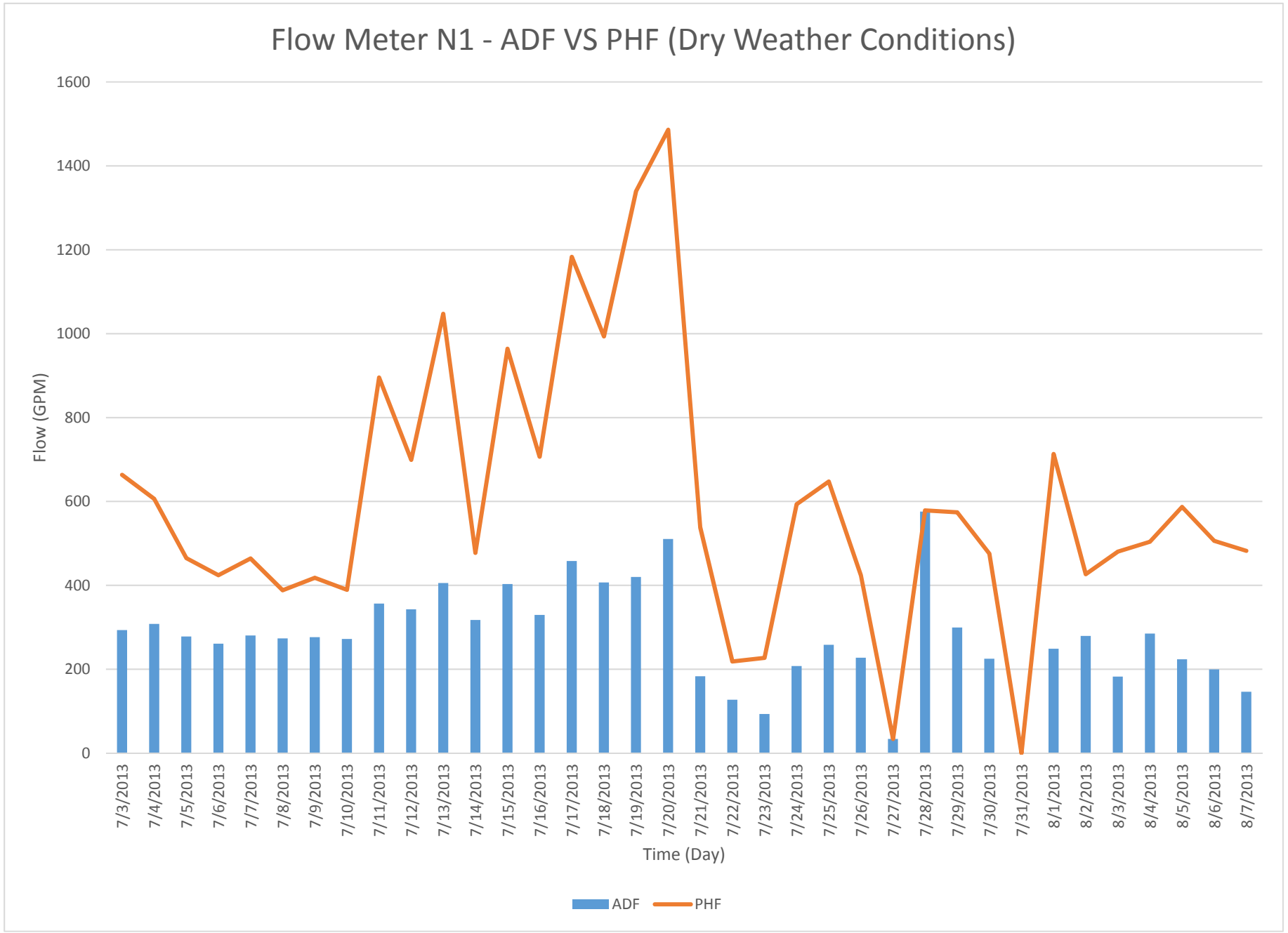
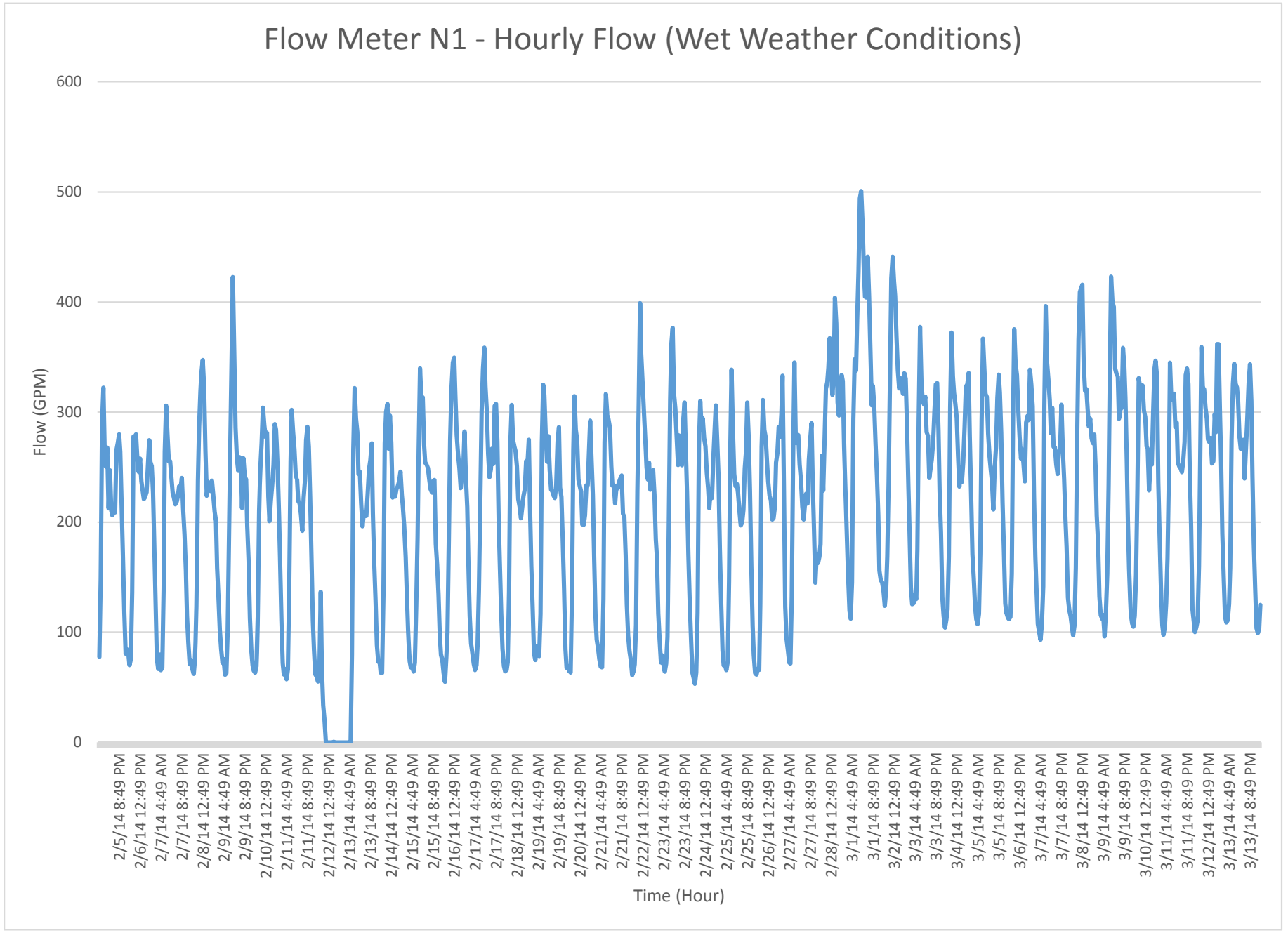
8/6/13 12:50 PM
8/7/13 4:50 AM
8/7/13 8:50 PM
Time (Hour)


Flow Meter N1 - ADF VS PHF (Dry Weather Conditions)
1600
1400
1200
1000
800
600
400
200
0
Flow (GPM)
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
7/28/2013
7/29/2013
7/30/2013
7/31/2013
8/1/2013
8/2/2013
8/3/2013
8/4/2013
8/5/2013
8/6/2013
8/7/2013
Time (Day)
ADF
PHF


Flow Meter N1 - Hourly Flow (Wet Weather Conditions)
Flow (GPM)
600
500
400
300
200
100
0
2/5/14 8:49 PM
2/6/14 12:49 PM
2/7/14 4:49 AM
2/7/14 8:49 PM
2/8/14 12:49 PM
2/9/14 4:49 AM
2/9/14 8:49 PM
2/10/14 12:49 PM
2/11/14 4:49 AM
2/11/14 8:49 PM
2/12/14 12:49 PM
2/13/14 4:49 AM
2/13/14 8:49 PM
2/14/14 12:49 PM
2/15/14 4:49 AM
2/15/14 8:49 PM
2/16/14 12:49 PM
2/17/14 4:49 AM
2/17/14 8:49 PM
2/18/14 12:49 PM
2/19/14 4:49 AM
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2/21/14 4:49 AM
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2/23/14 4:49 AM
2/23/14 8:49 PM
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2/25/14 8:49 PM
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2/27/14 4:49 AM
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2/28/14 12:49 PM
3/1/14 4:49 AM
3/1/14 8:49 PM
3/2/14 12:49 PM
3/3/14 4:49 AM
3/3/14 8:49 PM
3/4/14 12:49 PM
3/5/14 4:49 AM
3/5/14 8:49 PM
3/6/14 12:49 PM
3/7/14 4:49 AM
3/7/14 8:49 PM
3/8/14 12:49 PM
3/9/14 4:49 AM
3/9/14 8:49 PM
3/10/14 12:49 PM
3/11/14 4:49 AM
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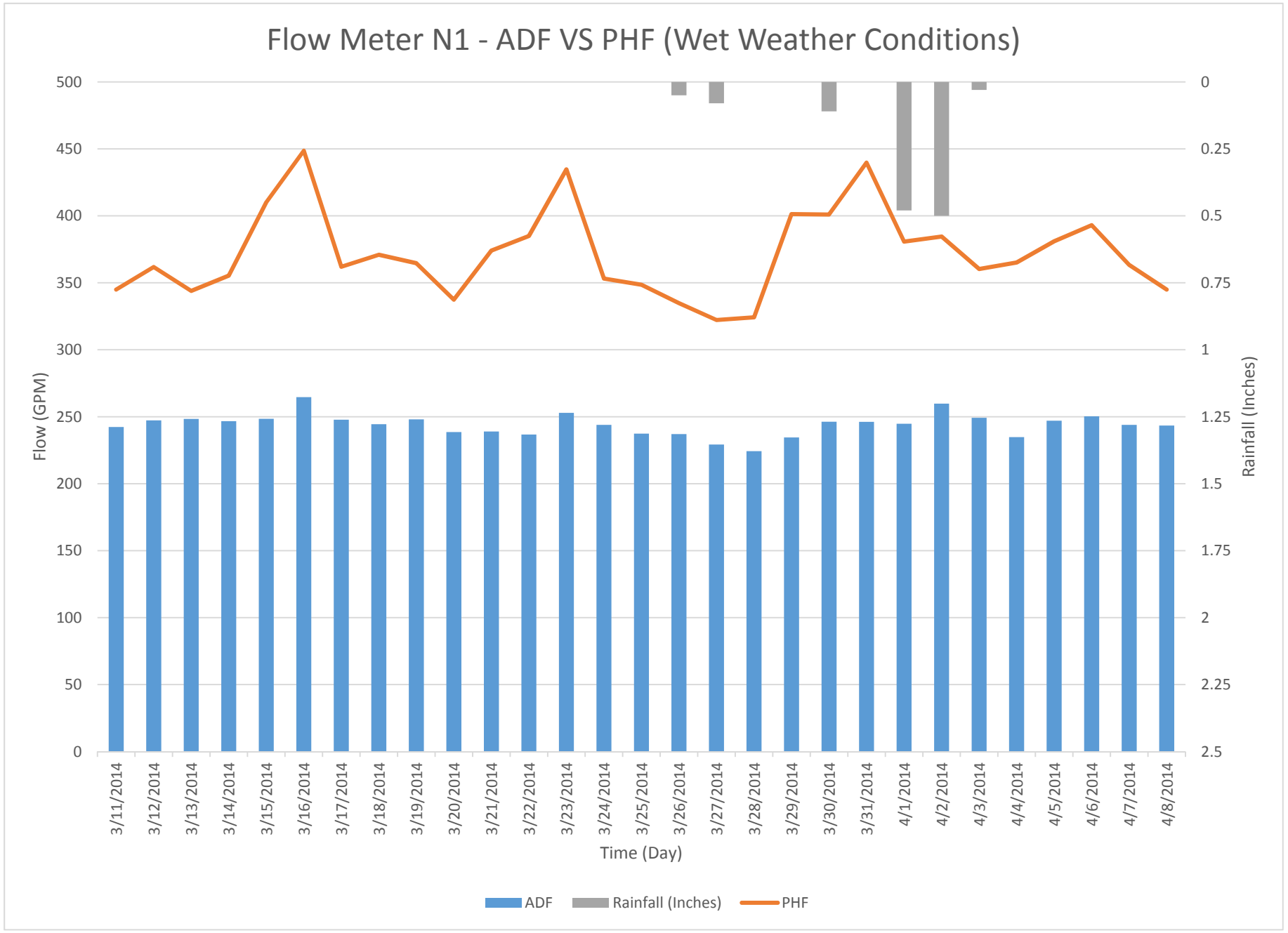
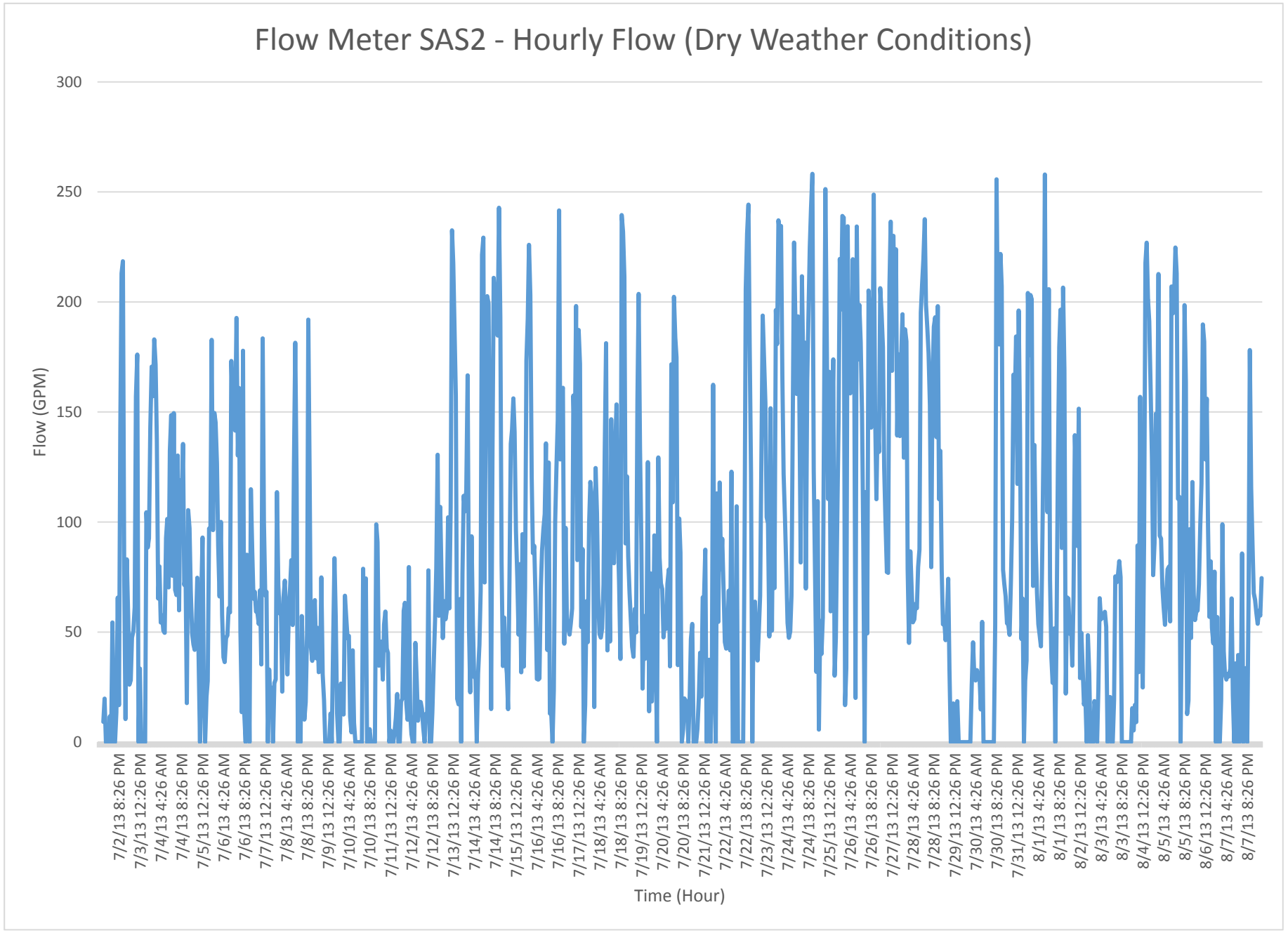
3/13/14 4:49 AM
3/13/14 8:49 PM
Time (Hour)


Flow Meter N1 - ADF VS PHF (Wet Weather Conditions)
500
450
400
350
300
250
200
150
100
50
0
Flow (GPM)
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
Rainfall (Inches)
3/11/2014
3/12/2014
3/13/2014
3/14/2014
3/15/2014
3/16/2014
3/17/2014
3/18/2014
3/19/2014
3/20/2014
3/21/2014
3/22/2014
3/23/2014
3/24/2014
3/25/2014
3/26/2014
3/27/2014
3/28/2014
3/29/2014
3/30/2014
3/31/2014
4/1/2014
4/2/2014
4/3/2014
4/4/2014
4/5/2014
4/6/2014
4/7/2014
4/8/2014
Time (Day)
ADF
Rainfall (Inches)
PHF


Flow Meter SAS2 - Hourly Flow (Dry Weather Conditions)
Flow (GPM)
300
250
200
150
100
50
0
7/2/13 8:26 PM
7/3/13 12:26 PM
7/4/13 4:26 AM
7/4/13 8:26 PM
7/5/13 12:26 PM
7/6/13 4:26 AM
7/6/13 8:26 PM
7/7/13 12:26 PM
7/8/13 4:26 AM
7/8/13 8:26 PM
7/9/13 12:26 PM
7/10/13 4:26 AM
7/10/13 8:26 PM
7/11/13 12:26 PM
7/12/13 4:26 AM
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7/14/13 4:26 AM
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7/22/13 4:26 AM
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7/24/13 4:26 AM
7/24/13 8:26 PM
7/25/13 12:26 PM
7/26/13 4:26 AM
7/26/13 8:26 PM
7/27/13 12:26 PM
7/28/13 4:26 AM
7/28/13 8:26 PM
7/29/13 12:26 PM
7/30/13 4:26 AM
7/30/13 8:26 PM
7/31/13 12:26 PM
8/1/13 4:26 AM
8/1/13 8:26 PM
8/2/13 12:26 PM
8/3/13 4:26 AM
8/3/13 8:26 PM
8/4/13 12:26 PM
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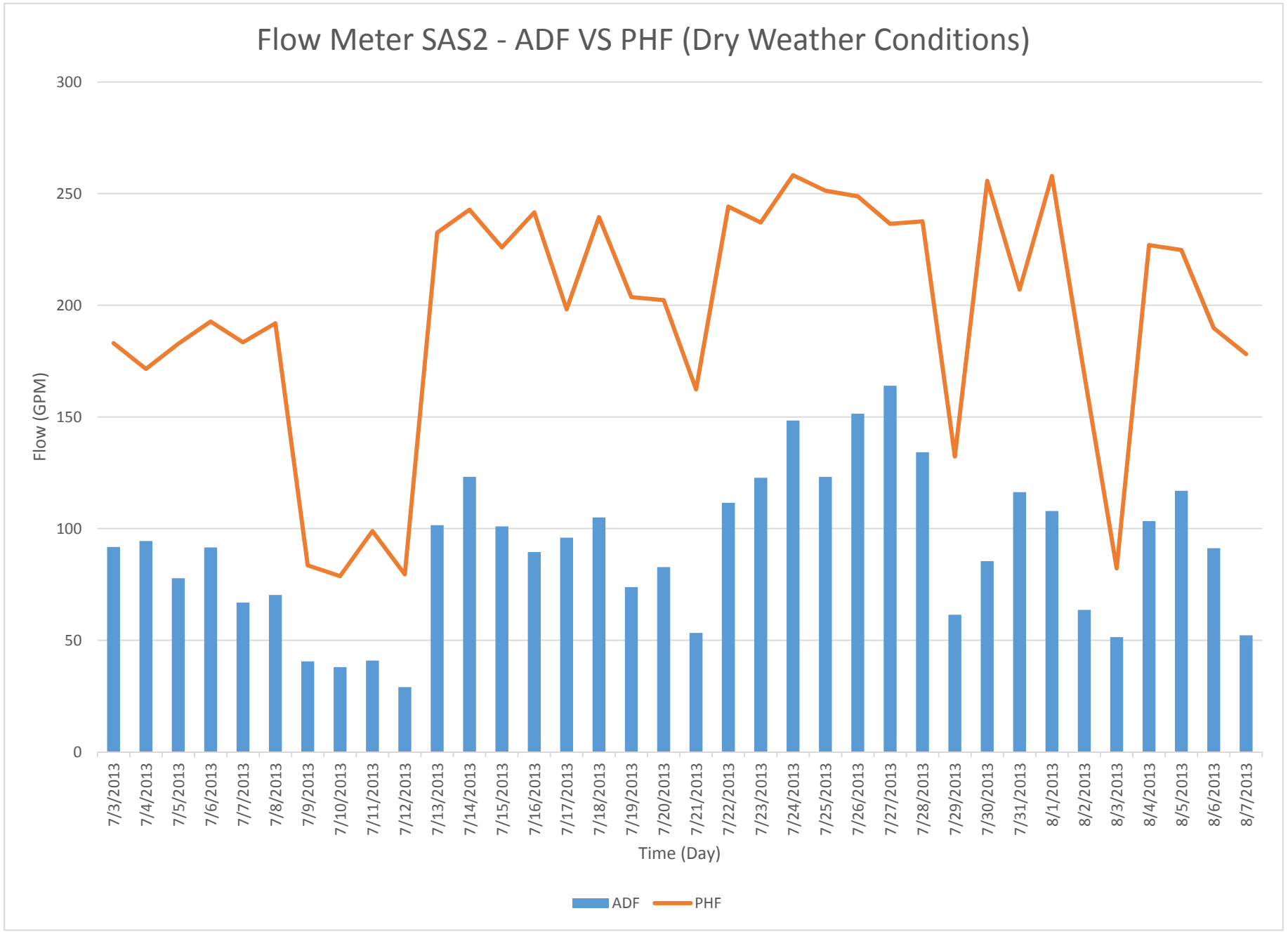
8/7/13 4:26 AM
8/7/13 8:26 PM
Time (Hour)


Flow Meter SAS2 - ADF VS PHF (Dry Weather Conditions)
300
250
200
150
100
50
0
Flow (GPM)
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
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7/19/2013
7/20/2013
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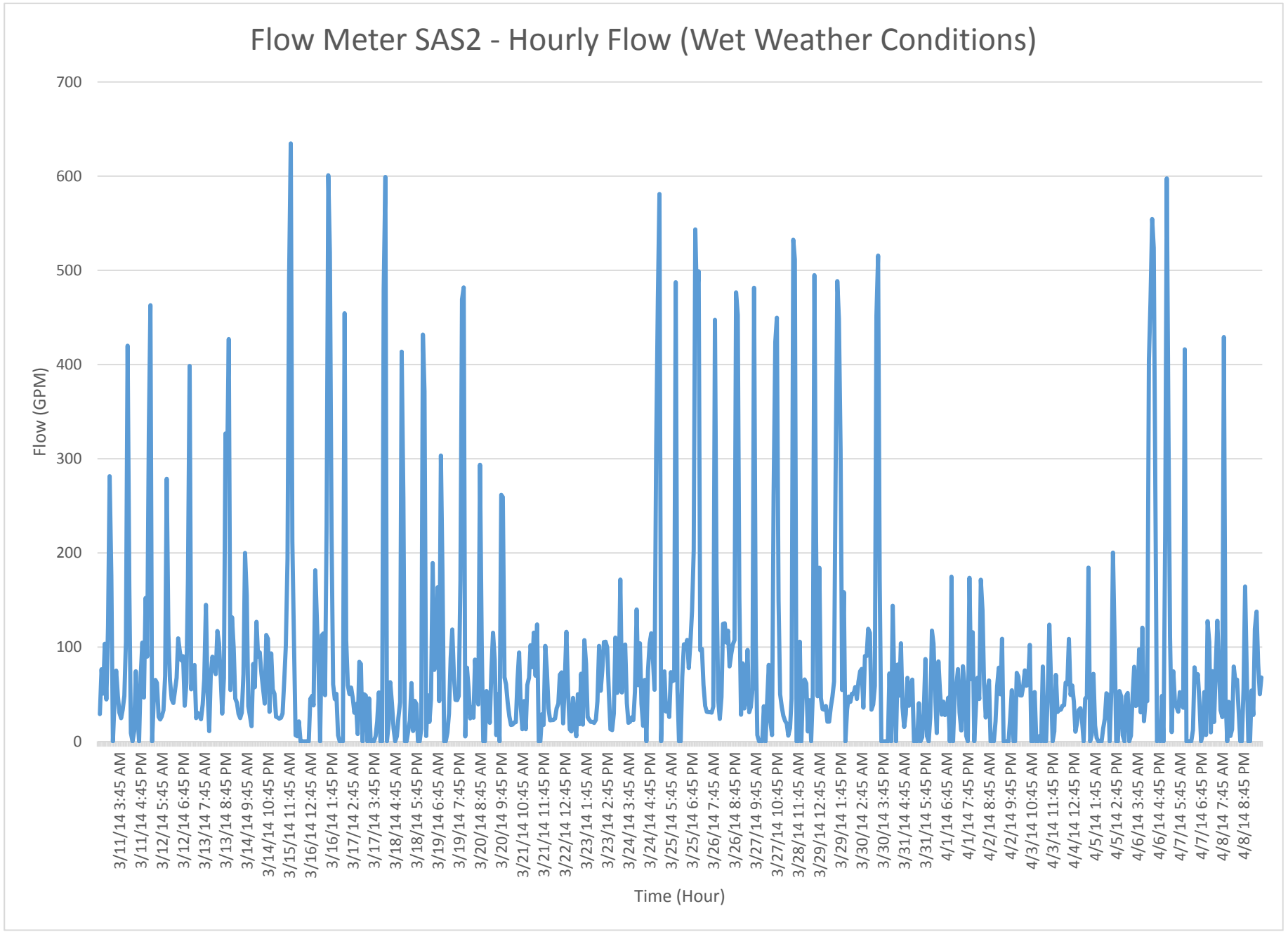
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
7/28/2013
7/29/2013
7/30/2013
7/31/2013
8/1/2013
8/2/2013
8/3/2013
8/4/2013
8/5/2013
8/6/2013
8/7/2013
Time (Day)
ADF
PHF


Flow Meter SAS2 - Hourly Flow (Wet Weather Conditions)
Flow (GPM)
700
600
500
400
300
200
100
0
3/11/14 3:45 AM
3/11/14 4:45 PM
3/12/14 5:45 AM
3/12/14 6:45 PM
3/13/14 7:45 AM
3/13/14 8:45 PM
3/14/14 9:45 AM
3/14/14 10:45 PM
3/15/14 11:45 AM
3/16/14 12:45 AM
3/16/14 1:45 PM
3/17/14 2:45 AM
3/17/14 3:45 PM
3/18/14 4:45 AM
3/18/14 5:45 PM
3/19/14 6:45 AM
3/19/14 7:45 PM
3/20/14 8:45 AM
3/20/14 9:45 PM
3/21/14 10:45 AM
3/21/14 11:45 PM
3/22/14 12:45 PM
3/23/14 1:45 AM
3/23/14 2:45 PM
3/24/14 3:45 AM
3/24/14 4:45 PM
3/25/14 5:45 AM
3/25/14 6:45 PM
3/26/14 7:45 AM
3/26/14 8:45 PM
3/27/14 9:45 AM
3/27/14 10:45 PM
3/28/14 11:45 AM
3/29/14 12:45 AM
3/29/14 1:45 PM
3/30/14 2:45 AM
3/30/14 3:45 PM
3/31/14 4:45 AM
3/31/14 5:45 PM
4/1/14 6:45 AM
4/1/14 7:45 PM
4/2/14 8:45 AM
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4/3/14 10:45 AM
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4/5/14 2:45 PM
4/6/14 3:45 AM
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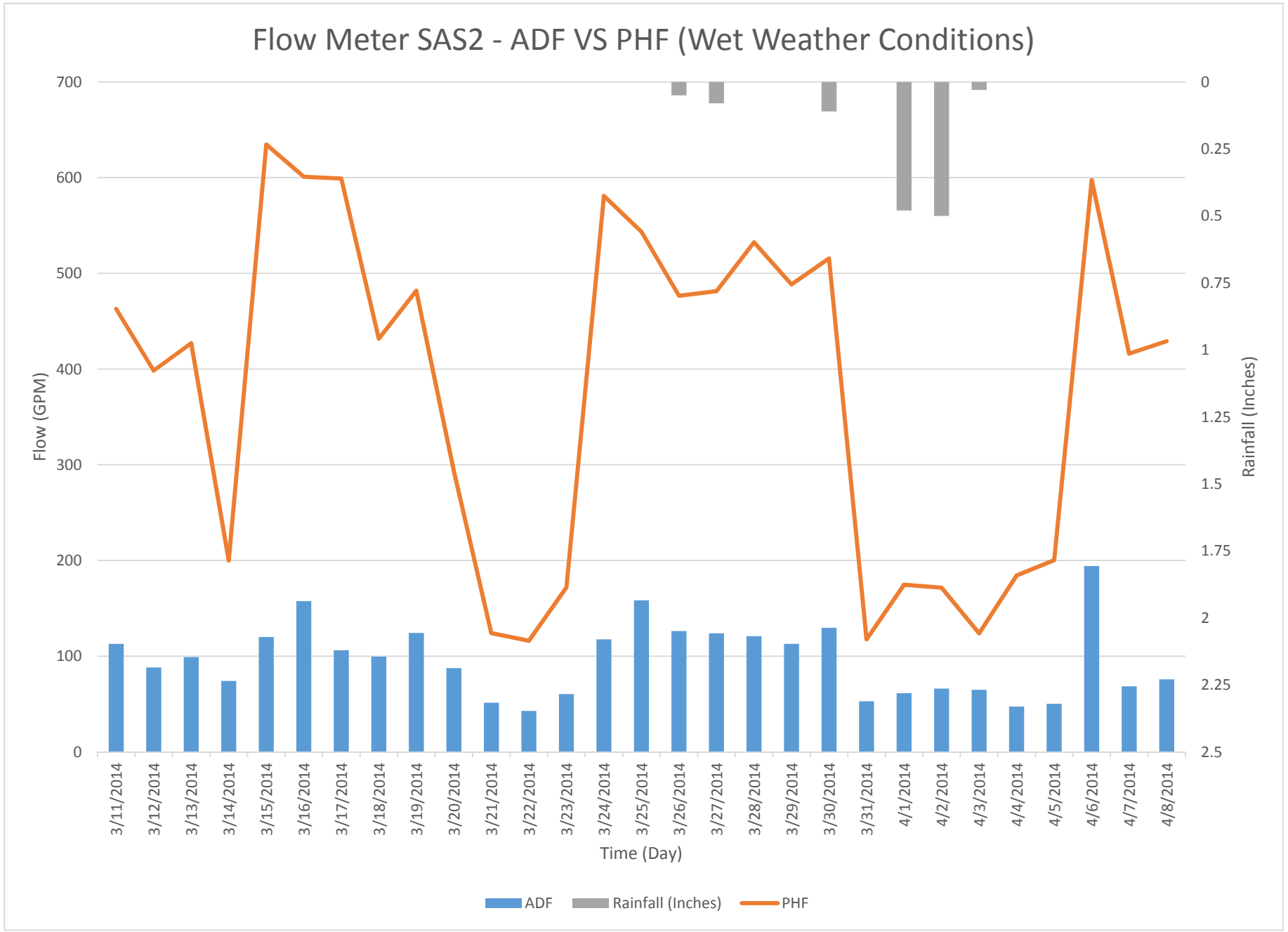
4/8/14 7:45 AM
4/8/14 8:45 PM
Time (Hour)


Flow Meter SAS2 - ADF VS PHF (Wet Weather Conditions)
Flow (GPM)
Rainfall (Inches)
Time (Day)
700
600
500
400
300
200
100
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
3/11/2014
3/12/2014
3/13/2014
3/14/2014
3/15/2014
3/16/2014
3/17/2014
3/18/2014
3/19/2014
3/20/2014
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3/23/2014
3/24/2014
3/25/2014
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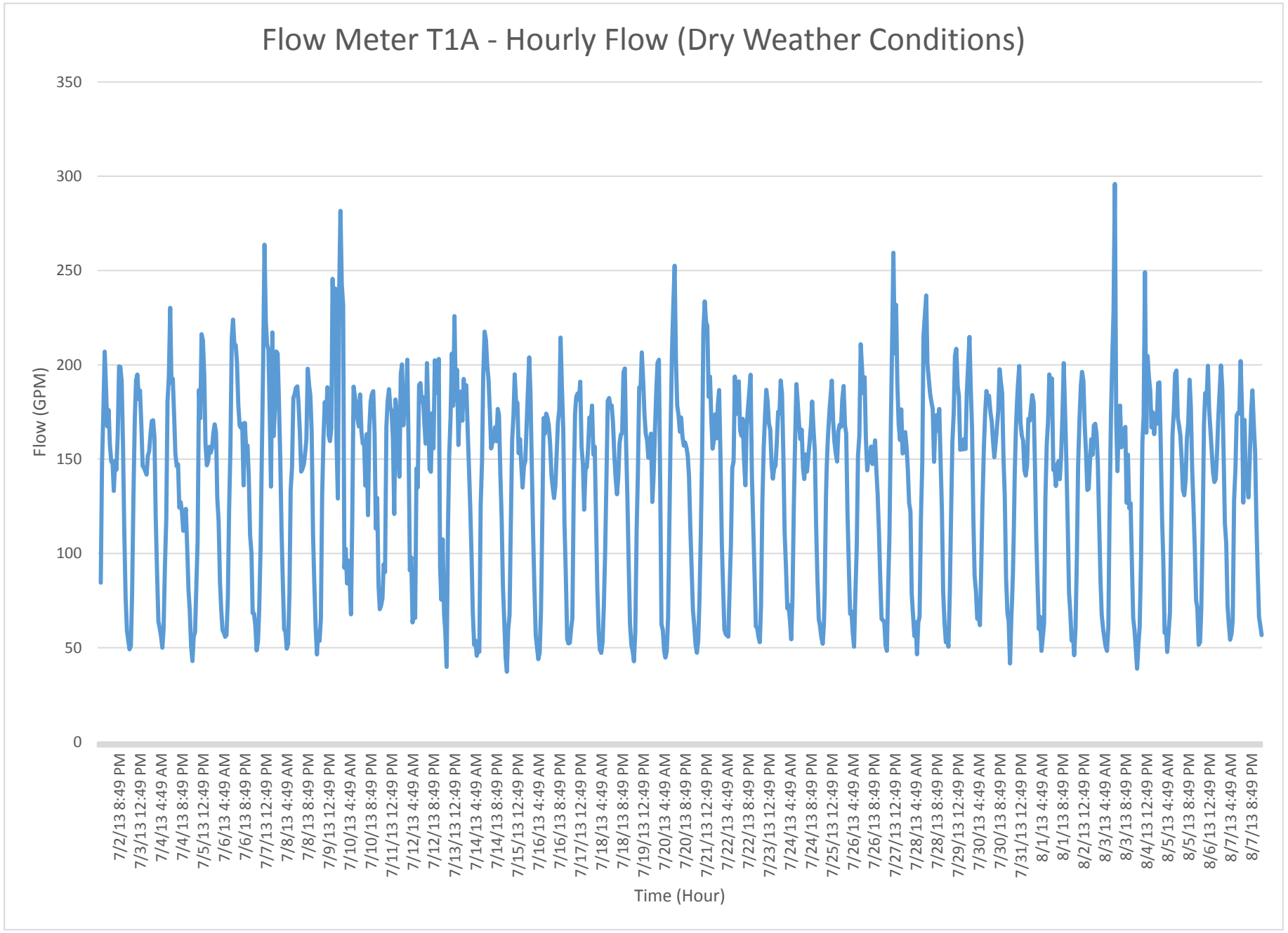
3/30/2014
3/31/2014
4/1/2014
4/2/2014
4/3/2014
4/4/2014
4/5/2014
4/6/2014
4/7/2014
4/8/2014
ADF
Rainfall (Inches)
PHF


Flow Meter T1A - Hourly Flow (Dry Weather Conditions)
Flow (GPM)
350
300
250
200
150
100
50
0
7/2/13 8:49 PM
7/3/13 12:49 PM
7/4/13 4:49 AM
7/4/13 8:49 PM
7/5/13 12:49 PM
7/6/13 4:49 AM
7/6/13 8:49 PM
7/7/13 12:49 PM
7/8/13 4:49 AM
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7/10/13 4:49 AM
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8/1/13 8:49 PM
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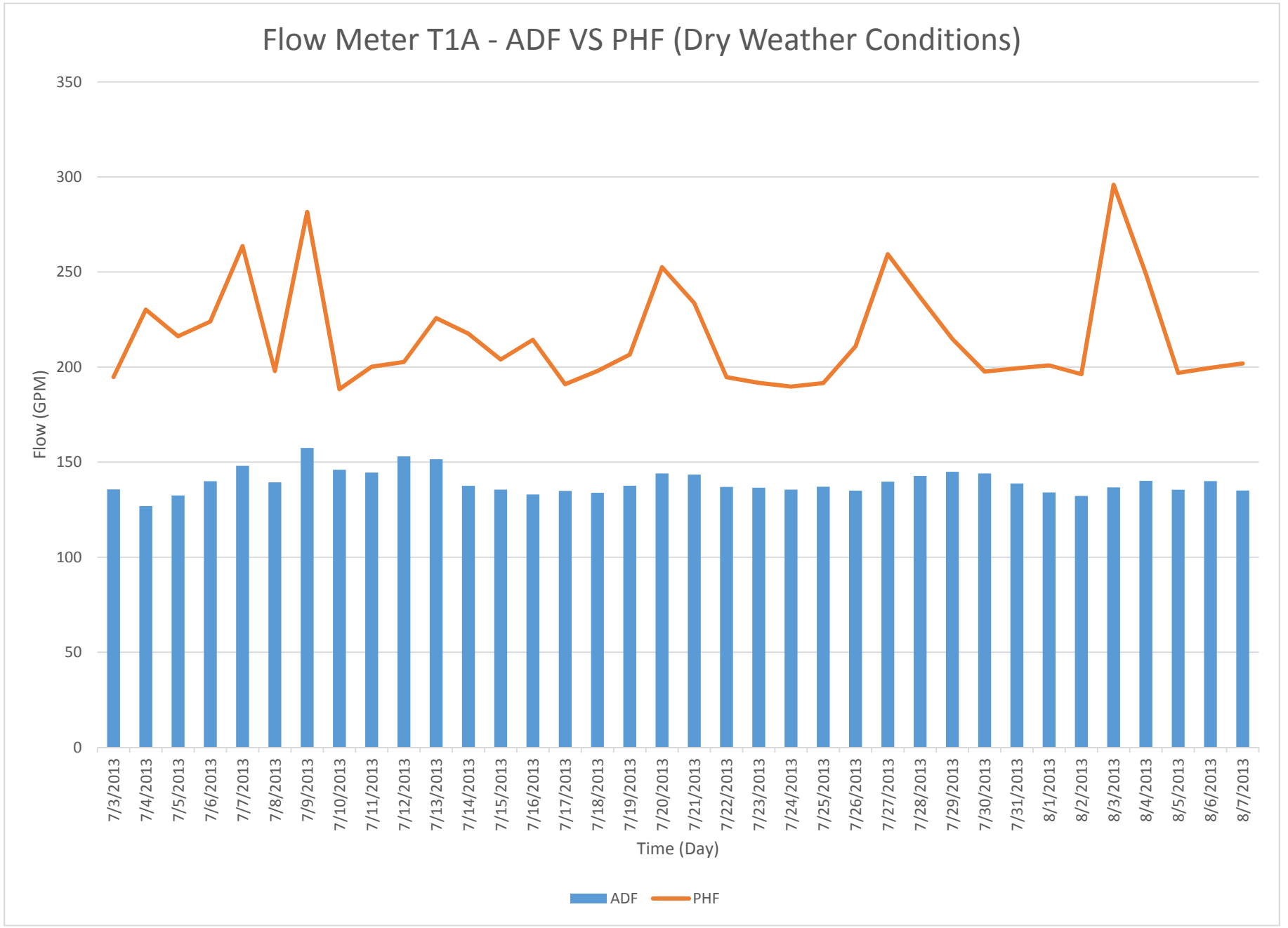
8/7/13 4:49 AM
8/7/13 8:49 PM
Time (Hour)


Flow Meter T1A - ADF VS PHF (Dry Weather Conditions)
350
300
250
200
150
100
50
0
Flow (GPM)
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
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7/14/2013
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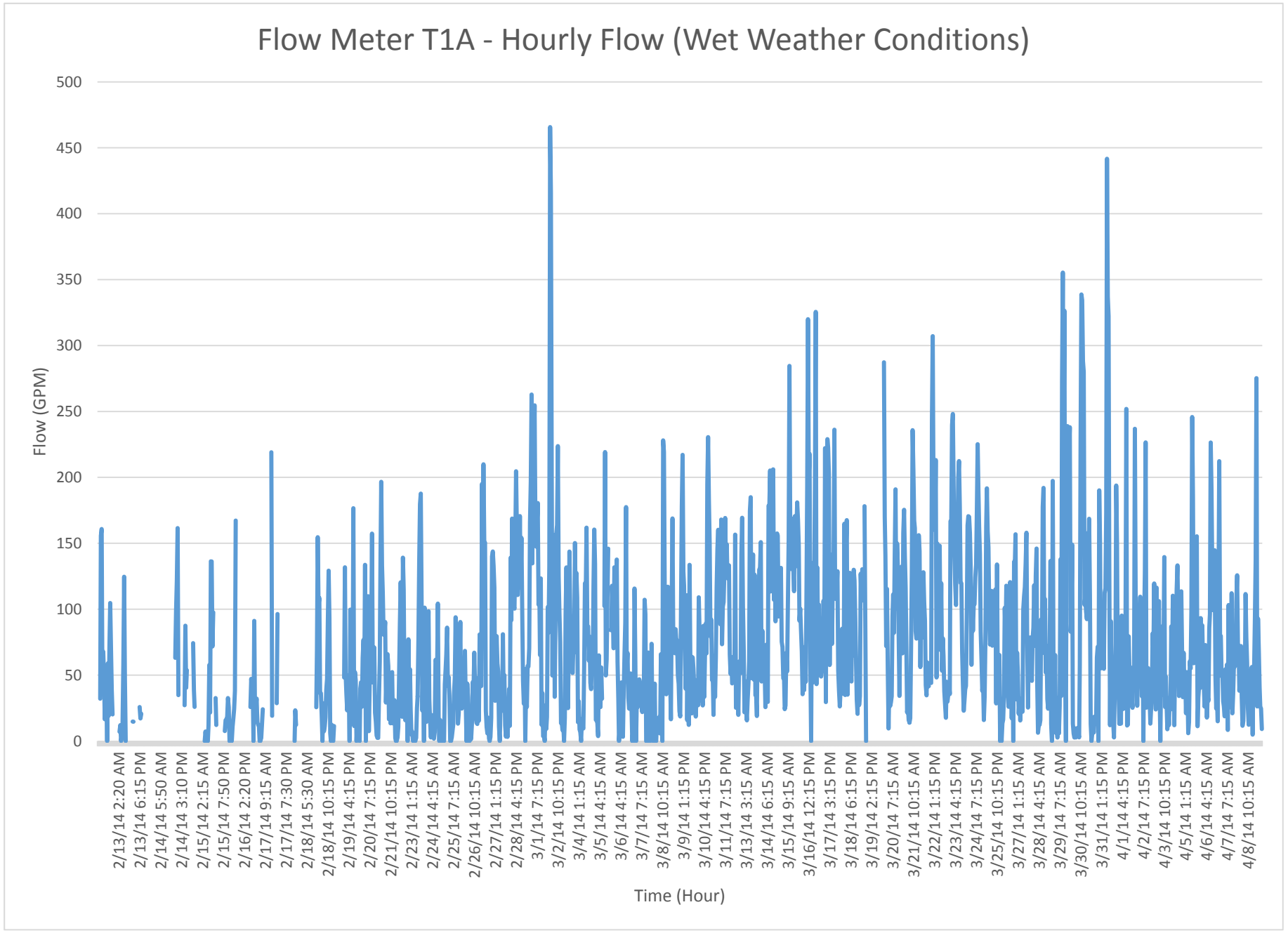
7/30/2013
7/31/2013
8/1/2013
8/2/2013
8/3/2013
8/4/2013
8/5/2013
8/6/2013
8/7/2013
Time (Day)
ADF
PHF


Flow Meter T1A - Hourly Flow (Wet Weather Conditions)
Flow (GPM)
500
450
400
350
300
250
200
150
100
50
0
2/13/14 2:20 AM
2/13/14 6:15 PM
2/14/14 5:50 AM
2/14/14 3:10 PM
2/15/14 2:15 AM
2/15/14 7:50 PM
2/16/14 2:20 PM
2/17/14 9:15 AM
2/17/14 7:30 PM
2/18/14 5:30 AM
2/18/14 10:15 PM
2/19/14 4:15 PM
2/20/14 7:15 PM
2/21/14 10:15 PM
2/23/14 1:15 AM
2/24/14 4:15 AM
2/25/14 7:15 AM
2/26/14 10:15 AM
2/27/14 1:15 PM
2/28/14 4:15 PM
3/1/14 7:15 PM
3/2/14 10:15 PM
3/4/14 1:15 AM
3/5/14 4:15 AM
3/6/14 4:15 AM
3/7/14 7:15 AM
3/8/14 10:15 AM
3/9/14 1:15 PM
3/10/14 4:15 PM
3/11/14 7:15 PM
3/13/14 3:15 AM
3/14/14 6:15 AM
3/15/14 9:15 AM
3/16/14 12:15 PM
3/17/14 3:15 PM
3/18/14 6:15 PM
3/19/14 2:15 PM
3/20/14 7:15 AM
3/21/14 10:15 AM
3/22/14 1:15 PM
3/23/14 4:15 PM
3/24/14 7:15 PM
3/25/14 10:15 PM
3/27/14 1:15 AM
3/28/14 4:15 AM
3/29/14 7:15 AM
3/30/14 10:15 AM
3/31/14 1:15 PM
4/1/14 4:15 PM
4/2/14 7:15 PM
4/3/14 10:15 PM
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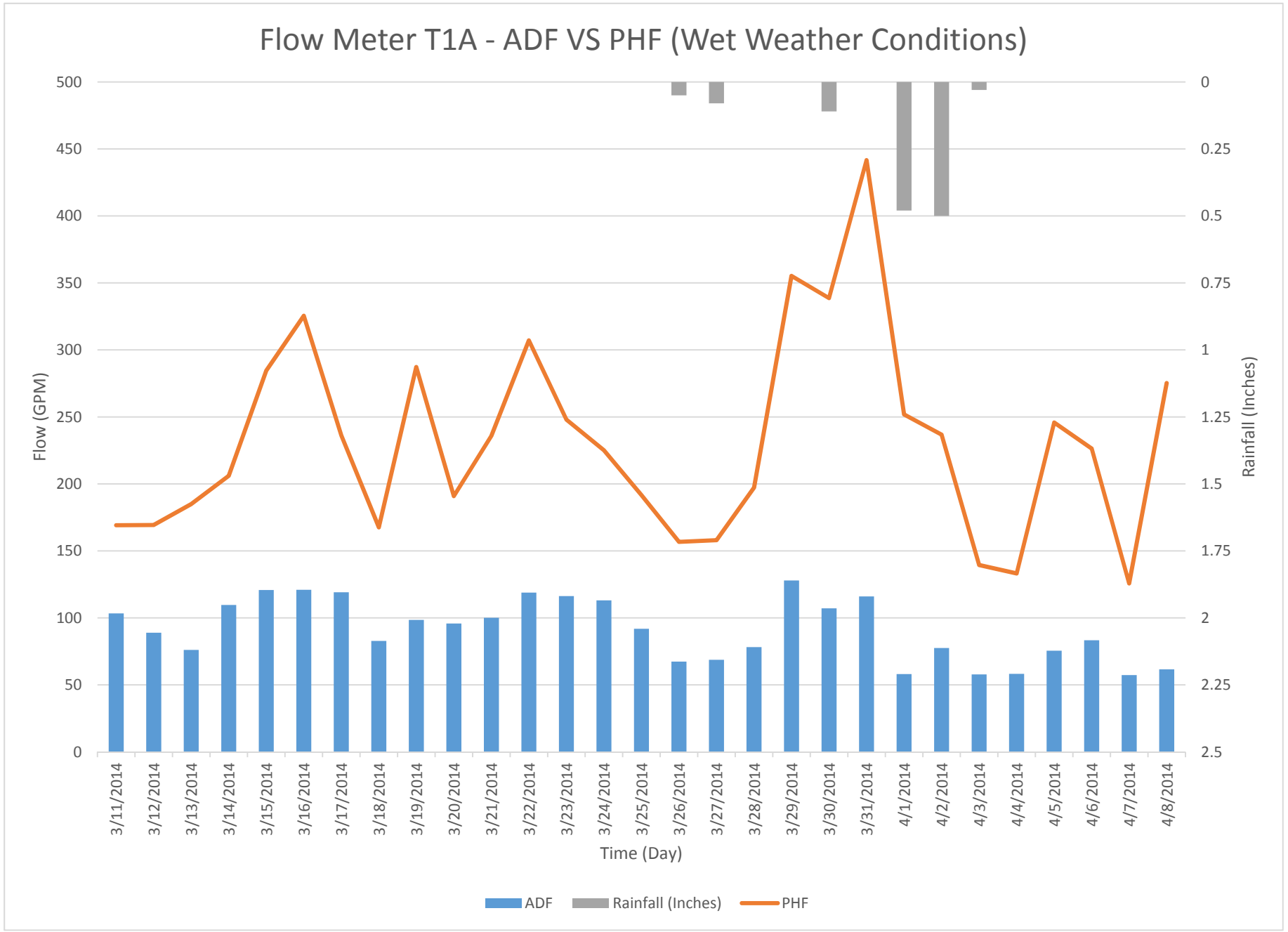
4/6/14 4:15 AM
4/7/14 7:15 AM
4/8/14 10:15 AM
Time (Hour)


Flow Meter T1A - ADF VS PHF (Wet Weather Conditions)
Flow (GPM)
Rainfall (Inches)
Time (Day)
500
450
400
350
300
250
200
150
100
50
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
3/11/2014
3/12/2014
3/13/2014
3/14/2014
3/15/2014
3/16/2014
3/17/2014
3/18/2014
3/19/2014
3/20/2014
3/21/2014
3/22/2014
3/23/2014
3/24/2014
3/25/2014
3/26/2014
3/27/2014
3/28/2014
3/29/2014
3/30/2014
3/31/2014
4/1/2014
4/2/2014
4/3/2014
4/4/2014
4/5/2014
4/6/2014
4/7/2014
4/8/2014
ADF
Rainfall (Inches)
PHF

APPENDIX D

Lift Station Condition Assessment and Observations

Lift Station No. 1

This lift station serves the Kennedy Club Fitness gym, which is near the lift station. The fitness club drains their pool to this lift station. The lift station smells of chlorine, not wastewater. High discharge rates during pool draining activities have the potential to overwhelm the lift station.

Figure 6-1: Recent modifications to the discharge point of Lift Station No. 1 may allow the surge tank to be removed from this facility.

- The force main associated with this lift station was shortened to approximately 1/3 of its original length, which significantly altered the hydraulics of the lift station. The pumps were not changed since the force main was modified, resulting in pumps that are operating off their pump curves. Consider trimming impellers on existing pumps, or replacing pumps to meet current hydraulic conditions.
- Operations staff would prefer submersible pumps rather than vertical turbine pumps currently installed to reduce maintenance.
- Surge tank at this location is showing significant corrosion. An offline inspection is recommended to determine corrosion on the interior of the surge tank. Sandblasting and recoating is recommended. A local dedicated air compressor would be beneficial.
- The surge tank may not be necessary at this site, due to a change in hydraulics. If hydraulics permit, the surge tank should be removed from the site.
- City staff would like to dye test facilities surrounding Kennedy Club Fitness Center to determine number of dischargers.
- There is not a local source of water at the site. Consider a adding a local water supply for cleaning the wet well.
- There are drainage issues at the site. If the nearby culvert under the freeway clogs, which has occurred in the past, the electrical panels would be flooded. Recommend raising the elevation of the area surrounding the wet well to divert stormwater flow around the facility.
- The pavement at the site is failing, and should be repaved or repaired.
- Public is not restricted from the site, and it is common for people to use the lift station driveway and wet well for exercises. A new fence around the facility and gate at the driveway is recommended to limit public access.
- Consider installing bollards, or k-rail to prevent damage to the facility by a freeway accident.

Lift Station No. 2

This lift station is in very poor condition. The City is currently working with a consultant to consider either reconstructing or abandoning Lift Station No. 2, as it is in very poor condition, and requires significant maintenance to keep the lift station operational. There is a major corrosion issue at this lift station, likely due to the presence of hydrogen sulfide (H_2S) gas.

Figure 6-2: Lift Station No. 2 is failing, and should be replaced or abandoned.

- The wet well coating is failed. The wet well walls should be hydro-blasted and repaired, prior to recoating.
- There are several steel beams in the wet well which are severely corroded, and should be repaired or replaced to maintain the vault hatches structural integrity.
- The wet well access hatches do not close completely due to the corroded steel beams and pose a tripping hazard to the public. The spring assists are broken on the hatches. The hatches should be replaced.
- Coating on piping in the wet well is failing. Backing rings on mechanical joint connections in wet well are failing. Piping should be replaced.
- There are significant grit and scum issues at this lift station, resulting in frequent pump maintenance caused by ragging and plugging.
- Operation staff indicated that the pumps have vibration issues.
- The wet well is likely oversized for the flows entering the lift station.
- The electrical panels are corroding and should be replaced. The electrical panels are also an arc flash hazard.
- Recommending adding a Sump Termination panel at this lift station to protect electrical equipment.
- The valve vault is full of water. A drain should be installed, and the valve vault lid replaced to prevent water from entering the lift station.
- Valves in the valve vault should be serviced or replaced, piping needs to be recoated, due to corrosion.
- There is not a local source of water at the site. Consider a adding a local water supply for cleaning the wet well.
- Bollards should be installed to protect the facility from traffic incidents.
- There are power lines directly over the wet well. These make it difficult to safely remove the pumps from the wet well. If the lift station is reconstructed, location of power lines should be considered.

Additional recommendations regarding the future abandonment or replacement of this lift station are included in Section 3.5.2.

Lift Station No. 3

In the event of a power outage or pump failure, this lift station overflows to percolation pond No. 3 at the treatment plant.

Figure 6-3: Lift Station No. 3 is in good condition, but site improvements would significantly improve working conditions at the site.

- Operations staff requests a new concrete slab to improve working conditions and to provide a solid foundation for equipment at the lift station.
- There is no lighting at the site. Recommend adding lighting to improve night time work environment.
- The railroad tie retaining wall adjacent to the lift station is failing, and should be replaced.
- There is not a local source of water at the site. Consider a adding a local water supply for cleaning the wet well.
- The valve vault lid is undersized, and requires entry into the vault to turn or exercise valves. It is an older style, and allows rain water into the vault. Also, it is heavy, with no spring assist. The existing vault lid is also showing signs of corrosion. A new vault lid with spring assist is recommended.

Lift Station No. 4

Figure 6-4: Lift Station No. 4 is in good working order. Minor improvements would reinforce the long term reliability and ease of operations at this facility.

- There is not a local source of water at the site. Consider a adding a local water supply for cleaning the wet well.
- The valve vault lid was repurposed from another lift station, and modified for this lift station. Steel plate (0.25 inches think) was used to form portions of the left station cover. While functioning well, the custom cover may have issues in the future, and is in need of recoating.
- There is some corrosion on the valves in the wet well. Servicing and recoating of discharge piping in the wet well is recommended.
- There is no Sump Termination panel at this lift station.
- Check valves in valve vault are old and should be serviced.
- The exterior of wet well is exposed in valve vault. Exterior of wet well appears to be missing grout between precast barrel sections.
- There is a connection between the valve vault and the wet well, in the head space of the wet well, which will allow sewer gasses to collect and accumulate in the valve vault. It is recommended that this penetration be sealed to reduce corrosion in the valve vault.
- Stepped area around the wet well is a tripping hazard.

Lift Station No. 5

The City is considering abandonment of this lift station, based on a 2006 report developed by Cannon and Associates.

If this lift station is to be maintained, the following improvements should be considered:

Figure 6-5: A long term plan needs to be developed for Lift Station No. 5, as it is deteriorating

- Odors and corrosive gasses are a problem at this lift station. Consider chemical dosing to reduce H_2S production.
- Scum and grit build up are common problems at this lift station. Pumps need frequent servicing due to ragging. Consider installing screening in the manhole upstream of the lift station.
- The coating on interior of wet well is starting to fail. Replacement of the wet well liner should be planned within the next 5 years.
- There are no locks on wet well access hatches. Hinges and locks should be installed immediately.
- There is significant corrosion on the discharge piping in the wet well. Rehabilitation is recommended.
- There is a ladder and platform system within the wet well. It is recommended the ladder and platform be removed to reduce the chance of confined space entry without protection.
- Discharge piping on the exterior of the wet well is a mix of materials, exhibiting various stages of corrosion. Coating of all above grade piping at the site is recommended.
- Surge tank at this location is showing significant corrosion. If the surge tank will remain, an offline inspection is recommended to determine corrosion on the interior of the surge tank. If hydraulically feasible, the surge tank should be removed from the site, and the hydraulics modified to reduce transient pressures.
- The emergency generator operates on natural gas, and there is no storage on site. In the event of a power and natural gas outage, there will be no back-up power at this facility. Consider converting generator to propane and adding propane storage on site.
- There is a manhole upstream of the wet well on site used for overflow storage, and connects to the overflow basin. The manhole ladder rungs should be removed, and a new lid is recommended, as the existing is antiquated and heavy.
- The lift station is equipped with a dirt-lined overflow basin. The basin is plowed each summer. Consider lining the basin with concrete to reduce percolation of untreated wastewater.
- The force main for this lift station is AC pipe, and is approximately 40 years old. Consider replacing the force main, which is at the end of the design life expected for this type of pipe.

Additional recommendations regarding major future modifications to this lift station, and the construction of a new lift station are included in Section 3.6.2.

Lift Station No. 6

This lift station was recently rehabilitated and is in excellent condition. During the rehabilitation, budget constraints necessitated that elements were removed from the project.

- The site is not paved. It is recommended that asphalt or drain rock be installed at the site to provide a clean working service. The surface treatment should be extended to the parking area for ease of access during wet weather.
- A man gate is requested by operation staff to simplify access to the site.
- Discharge piping in the wet well is showing signs of surface corrosion
- Installation of bollards at the site may help to protect the facility from traffic on Traffic Way.

Figure 6-6: Lift Station No. 6 was recently rehabilitated, but due to budget constraints, some site improvements were omitted from the project.

Lift Station No. 7

This lift station is not connected to the SCADA system. Operations staff would like to abandon this lift station, located in a roadway, and convert it to gravity flow. It is likely feasible to install a new gravity main from the existing lift station to Mananita Avenue underneath an existing drainage swale, then connect into the existing gravity system.

Figure 6-7: The City would like to re-route wastewater from this lift station by gravity to Mananita Avenue, and abandon Lift Station No. 7.

If this lift station is to be maintained, the following improvements should be considered:

- There is not a local source of water at the site. Consider a adding a local water supply for cleaning the wet well.
- Connect the lift station to the SCADA system, and upgrade the electrical system to City standards.
- The wet well cover is heavy and requires two people to open/close it. It is recommended that the cover be replaced with a City standard hatch cover.
- The coating on discharge piping in the wet well is failing and should be repaired.
- The valve vault fills with rainwater during storms. Enhancing the vault drain to keep the vault from filling with water is recommended.
- The valve vault cover is a bolt down type, which is difficult to open, and allows rainwater to enter the vault. Recommend replacing valve vault cover.
- Piping in valve vault is corroded. Valves should be serviced or replaced and piping should be coated.

Lift Station No. 9

Lift Station No. 9 is in good condition. Minor improvements would reinforce the long-term reliability and ease of operations at this facility.

- The doors of the electrical shed conflict with the opening and closing of the wet well hatch. Working on the electrical panel when the wet well is open could be hazardous.
- There is minor water damage to the electrical shed, at the bottom of the doors.

Figure 6-8: Lift Station No. 9 is in good condition.

Lift Station No. 11

An arc flash recently occurred at this lift station, and the entire electrical system was replaced.

Figure 6-9: Lift Station No. 11 is in a hazardous location, and bypassing the lift station requires shutting down one lane of traffic.

- The lift station is located in a roadway. Working on the lift station is hazardous. There is no parking for vehicles, and a lane needs to be blocked for any work to occur. If the station needs to be bypassed for extended periods, the roadway needs to be taken down to one lane.
- It is recommended a permanent bypass line and portable pump connections be established outside of the roadway to allow bypassing without impacting the flow of traffic.
- The valve vault hatch is very heavy, and cannot be opened by one person. Only one leaf of the vault will open. Entry into valve vault is required to operate valves. Replacing the vault lid is recommended.
- The valve vault fills with water during rain events. Improvements to the vault drainage system, or a sealed vault lid are recommended, and servicing or replacing valves in valve vault, and recoating piping is also recommended.
- Welds on the wet well hatch are failing and should be repaired.
- Grease and scum mats are common at this lift station. Operations staff believes these issues are cause by the restaurant that discharges to this part of the system. Consider more stringent regulation of high grease dischargers.

Lift Station No. 13

A capital improvement project is currently planned at this facility to redesign the force main for Lift Station No. 13 to improve hydraulics and reduce odor complaints.

Figure 6-10: The City would like to shorten the alignment of the force main for Lift Station No. 9 to reduce odor complaints and change system hydraulics.

- A lime dosing facility is on site, which is set on a timer. The City would like to eliminate chemical dosing if possible due to the approximately $40,000 annual cost of chemical dosing.
- If long-term chemical dosing facilities are planned, a more permanent installation would be beneficial, and would reduce maintenance. The existing chemical dosing system appears temporary.
- The secondary containment for chemical storage fills with water during a rain storm and needs to be manually drained to the wet well.
- The City has reported significant odor problems at the force main discharge point, especially when the chemical dosing system is out of service. Consider shortening the force main to change the discharge point to a less populated area. Installing a vortex manhole at the transition from force main to gravity may be able to further reduce odor complaints. Calibration and additional controls on the chemical dosing system may reduce costs associated with chemical dosing to reduce odors.
- The eyewash and piping on site tends to freeze and crack piping. Consider installing commercial insulation products on water piping system.
- The discharge piping between the pumps and force main is 3” in diameter, reducing lift station capacity.
- Access to the wet well is limited. Primary access hatch pump assist springs are broken. Vertical turbine pumps barely fit through pump access holes in wet well top. A larger wet well hatch is recommended.
- The wet well lining is starting to fail. Limited cracking and separation is occurring near top of wet well. Replacement of the wet well lining will be required within 10 years.
- Coatings on piping in wet well have started to fail, and should be recoated.
- Raised wet well and piping create a constrained work environment at the site. Expanding, or reconfiguring the site would simplify access, but may be cost prohibitive.
- Replacing the bolts for the pump mounts with 316 stainless bolts is recommended, due to corrosion.
- The pumps are noisy when operating, disturbing the neighboring preschool. Staff would prefer submersible pumps to simplify maintenance and reduce noise. Ebara submersible pumps are recommended per City standards.
- Storm drainage and excess irrigation flows across the corner of the site, causing moss to form and a potential slip hazard. Simple drainage improvements at the size would eliminate this issue.
- The installation of a sump termination box to protect electrical panel is recommended.

- The potential for replacing the surge tank with alternative strategies to reduce transient pressures is recommended. If the surge tank is to remain, an offline condition assessment is recommended.

Lift Station No. 14

Lift Station No. 14 is in good condition. Minor improvements would reinforce the long term reliability and ease of operations at this facility.

Figure 6-11: The design of the surface features at Lift Station No. 14 creates a challenging work environment.

- The City would like to replace the existing pumps with Ebara submersible pumps per City standard.
- The top of the valve vault and the wet well are sunken into the site, with a raised curb around the sunken area. This causes a tripping hazard, and challenging working surface. This may be a result of the lift station being sited in a flood area. The concrete within the sunken area is cracked, assumed to be a result of differential settling around the wet well and valve vault. It is recommended that the tops of the wet well and valve vault be raised to the elevation of the top of the curb.
- There is no lighting at the site. Recommend adding overhead lighting for night work.
- There are two valve boxes at the site labeled “water”. It is recommended that the valve covers be replaced with “sewer” lids to avoid confusion.
- Installing a sump termination box to protect the electrical panel is recommended.
- Operations staff requests a new electrical service, to more easily electrically isolate the electrical panel. Currently, the seal on the meter is broken, and to isolate the panel, a fuse box needs to be removed. There is a potential safety hazard when working in the electrical panel when active.
- The check valves in the valve vault are old and should be serviced or replaced.

Lift Station No. 15

Lift Station No. 15 is in good condition. Minor improvements would reinforce the long-term reliability and ease of operations at this facility.

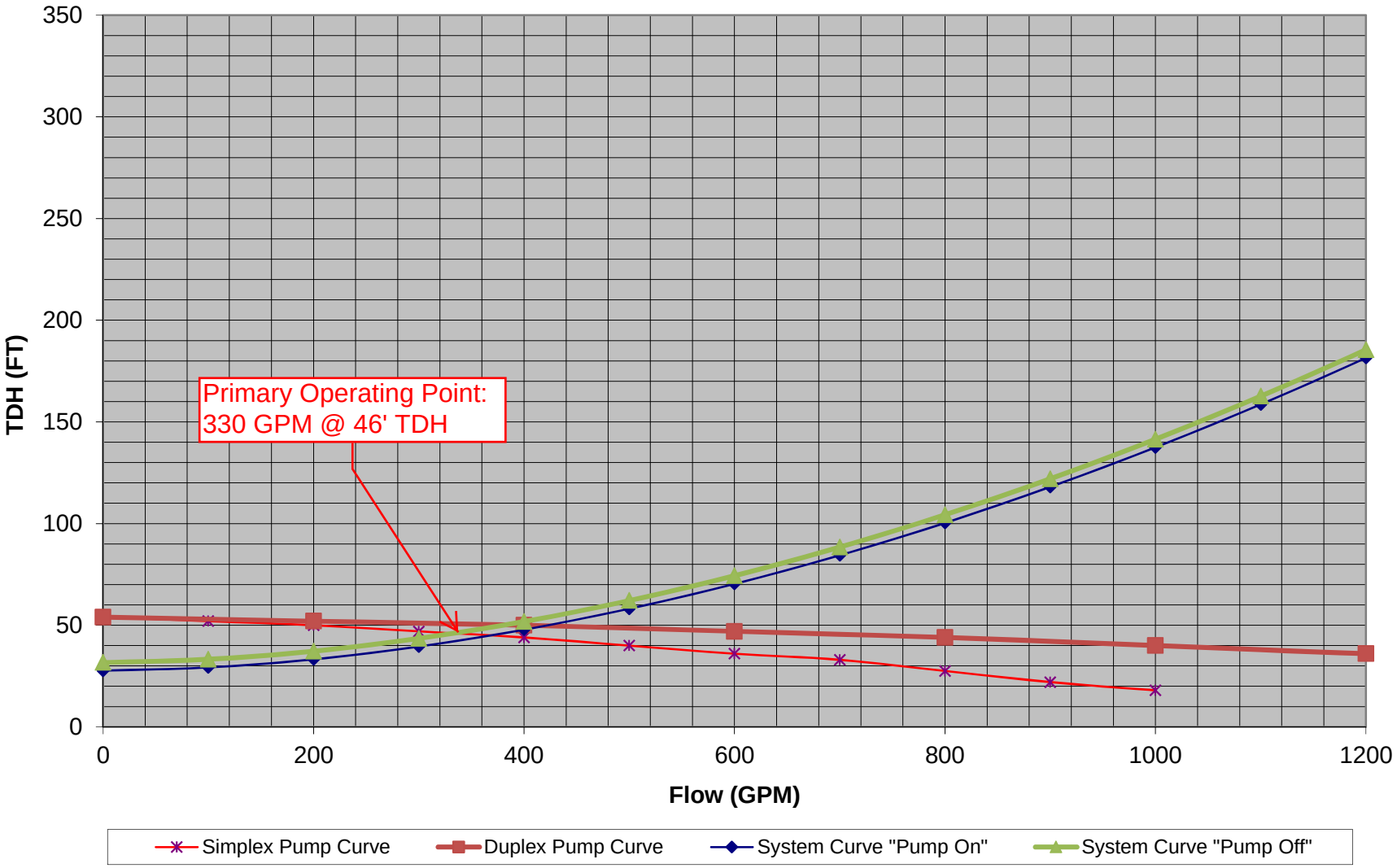
Figure 6-12: Lift Station No. 15 is in good condition.

- The City would like to replace the existing submersible pumps with Ebara submersible pumps per City standard.
- Children use the driveway to the lift station for a play area, and it is often littered with toys. Notice should be provided to the homeowner that access needs to be maintained at all times.
- A man gate is requested at the lift station to simplify access.
- There is no lighting at the site. Recommend adding overhead lighting.
- Access to the site is challenging. A tight turn to the access road requires backing into, or out of the area. Modifying the fence line to allow turning area at the site could alleviate this issue.
- There is not a local source of water at the site. Consider adding a local water supply for cleaning the wet well.
- An issue has been identified when the upstream private lift station is operating simultaneously with this lift station. Air entrainment can cause airlock of the pumps, or the pumps can become overwhelmed. Additional research on strategies to eliminate this issue is recommended.

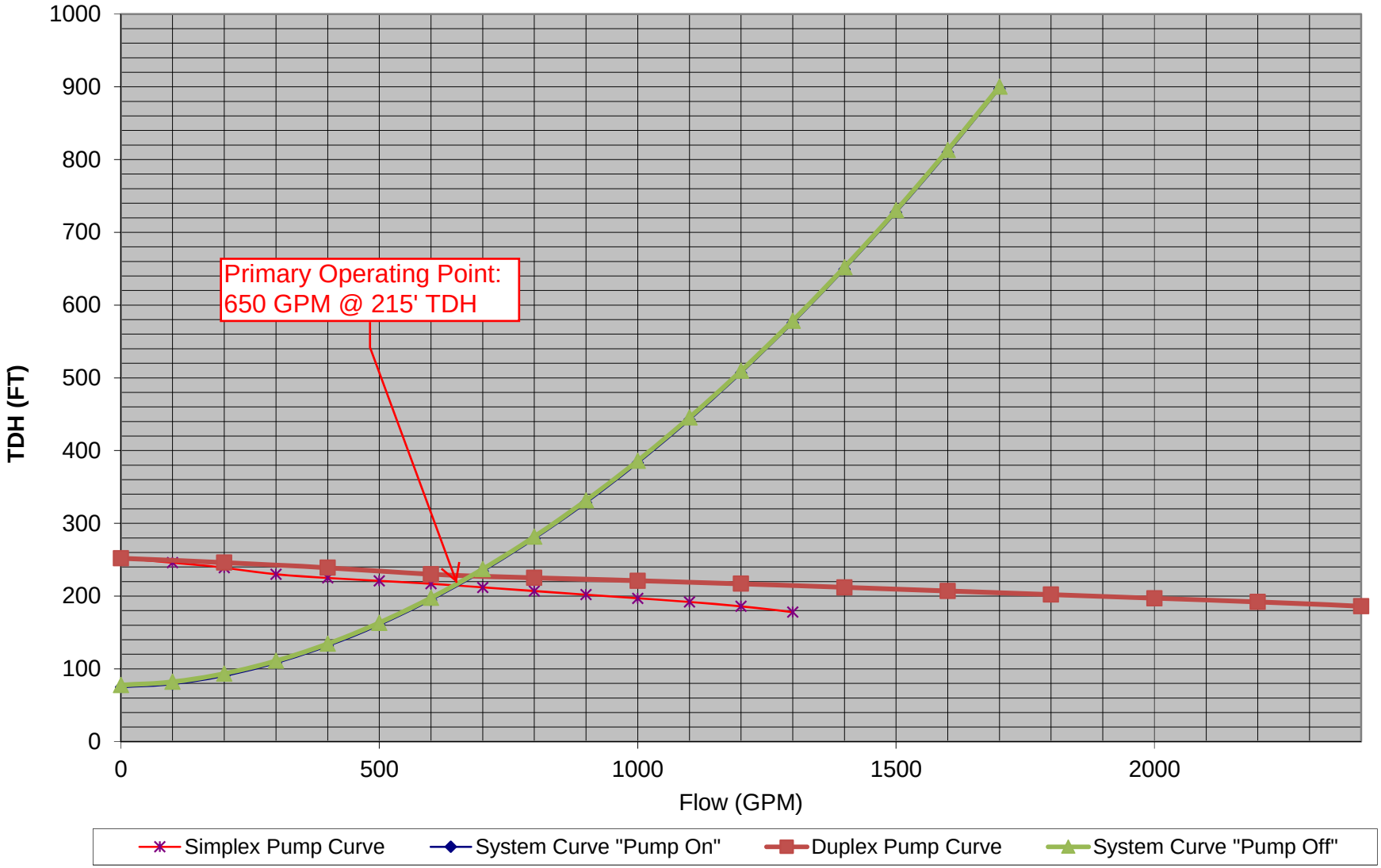
APPENDIX E

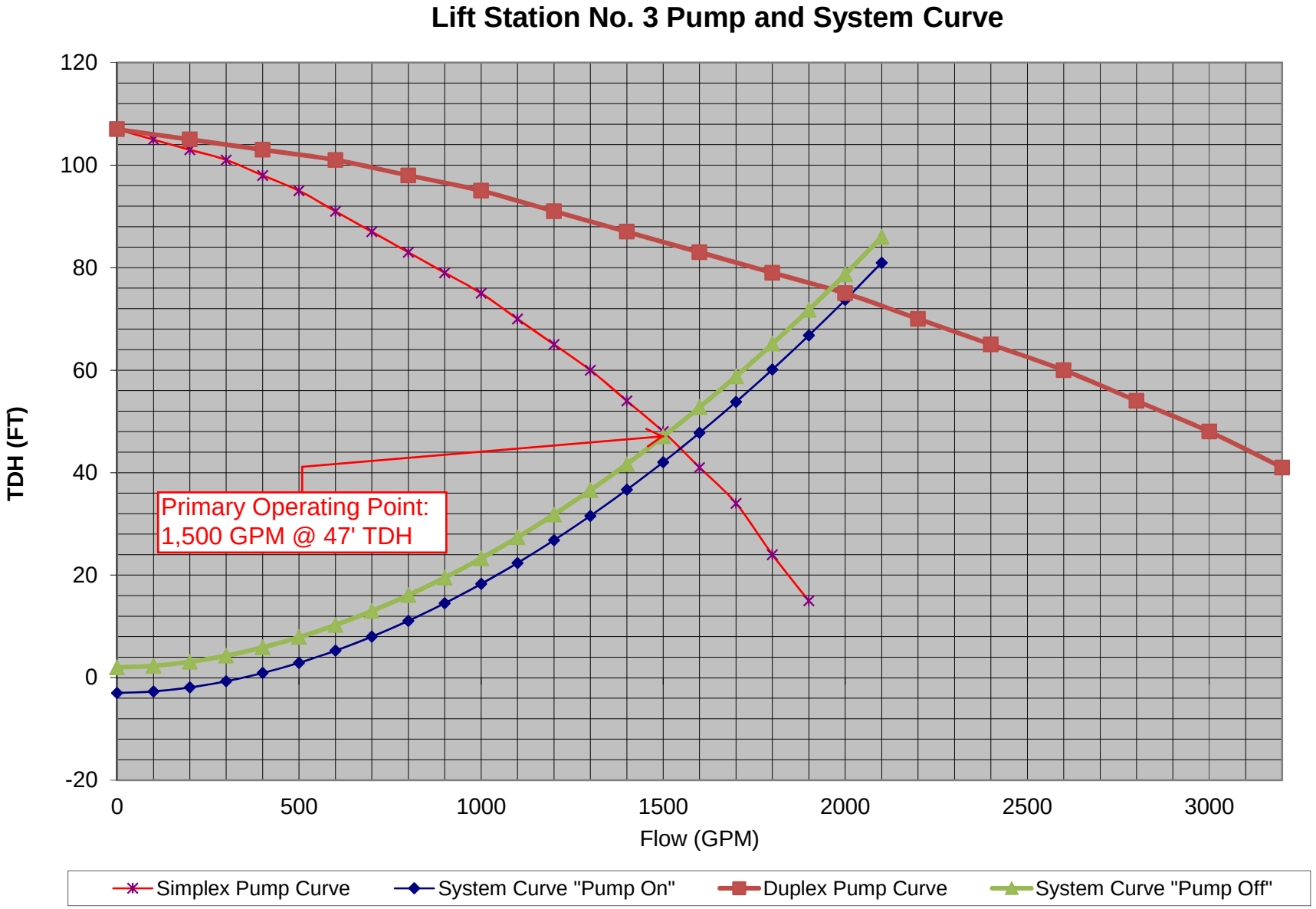
Lift Station Pump and System Curves

Lift Station No. 1 Pump and System Curves

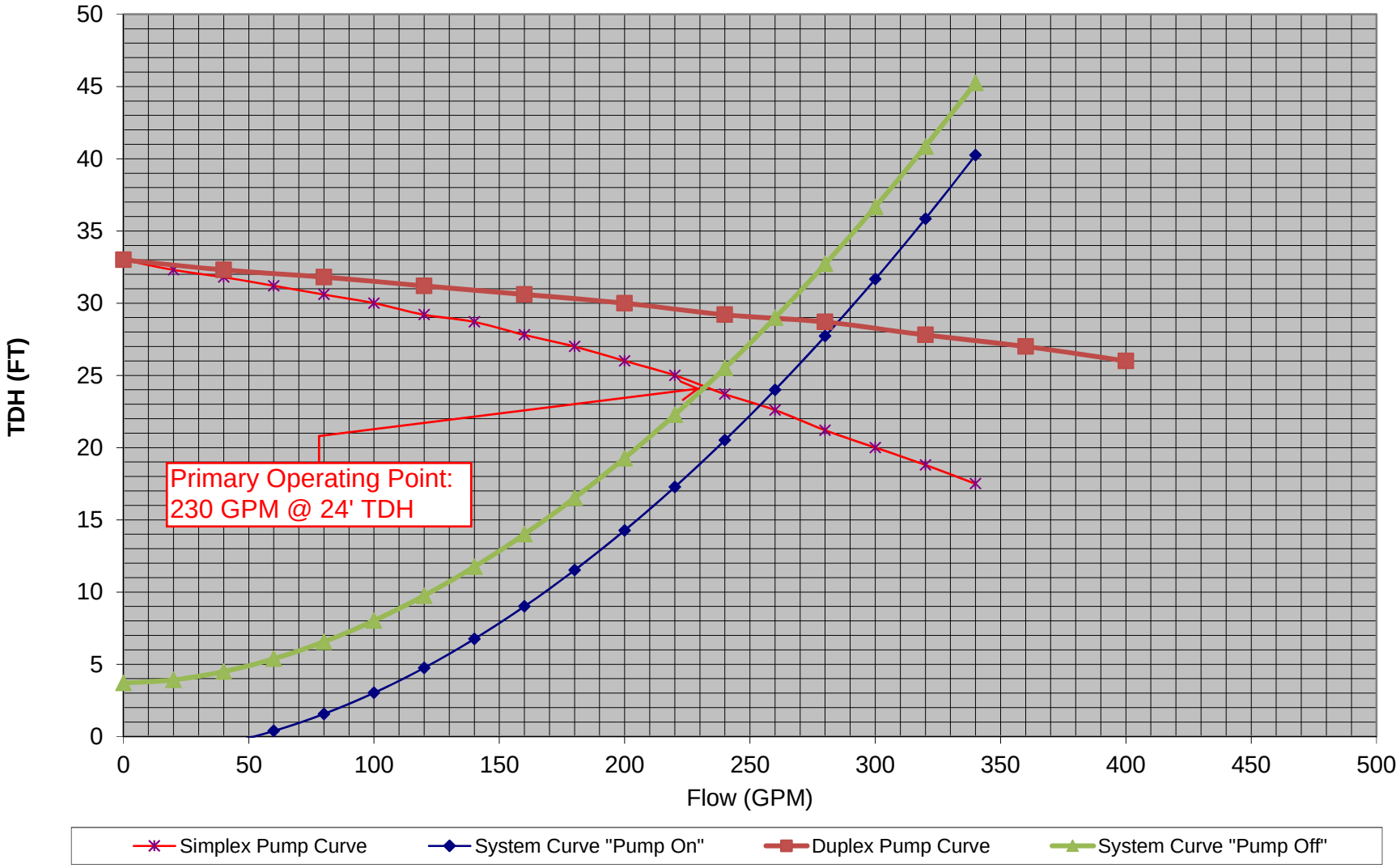


Lift Station No. 2 Pump and System Curve

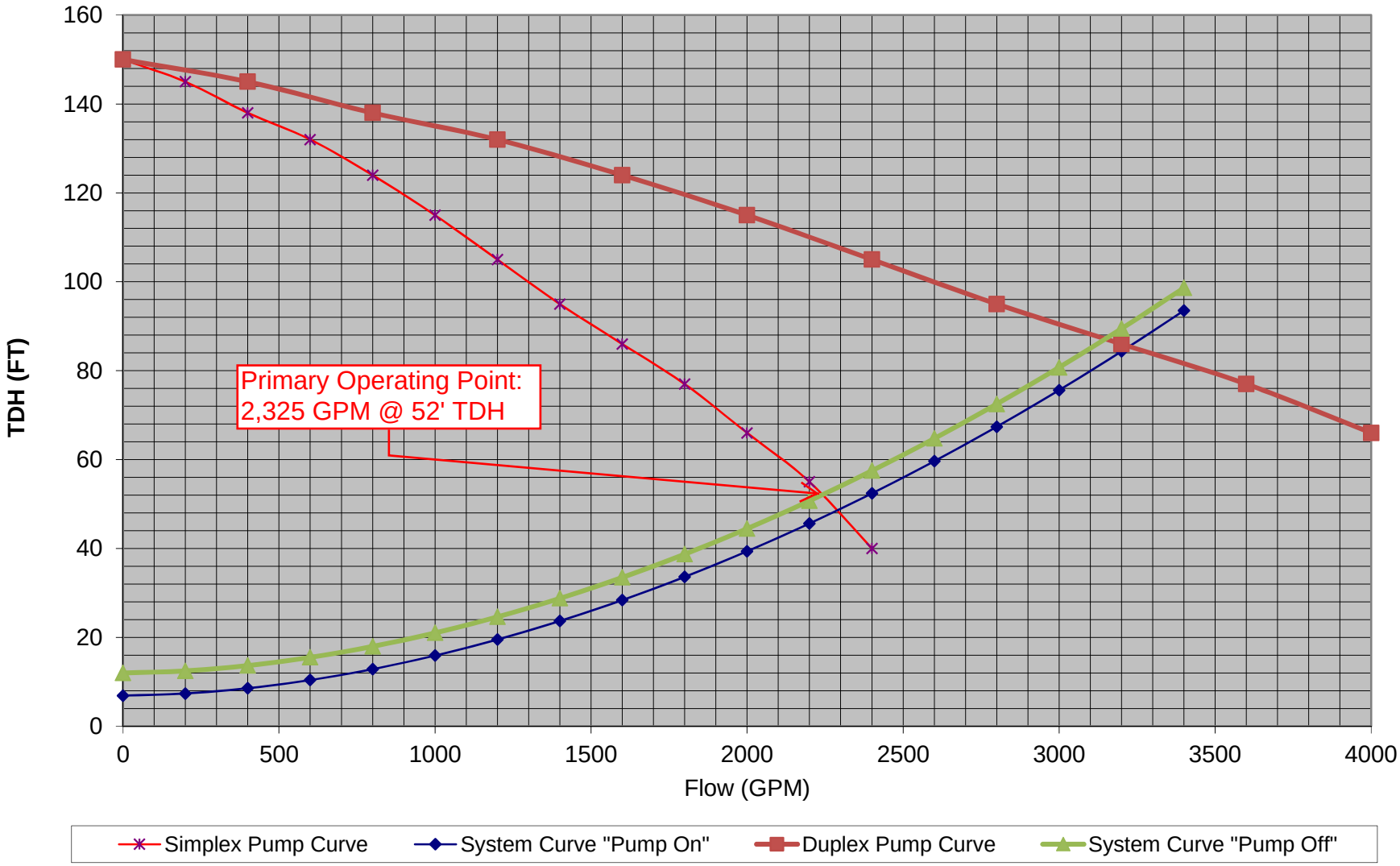



Lift Station No. 3 Pump and System Curve
TDH (FT)
120
100
80
60
40
20
0
-20
0
500
1000
1500
2000
2500
3000
Flow (GPM)
Primary Operating Point:
1,500 GPM @ 47' TDH
Simplex Pump Curve
System Curve "Pump On"
Duplex Pump Curve
System Curve "Pump Off"

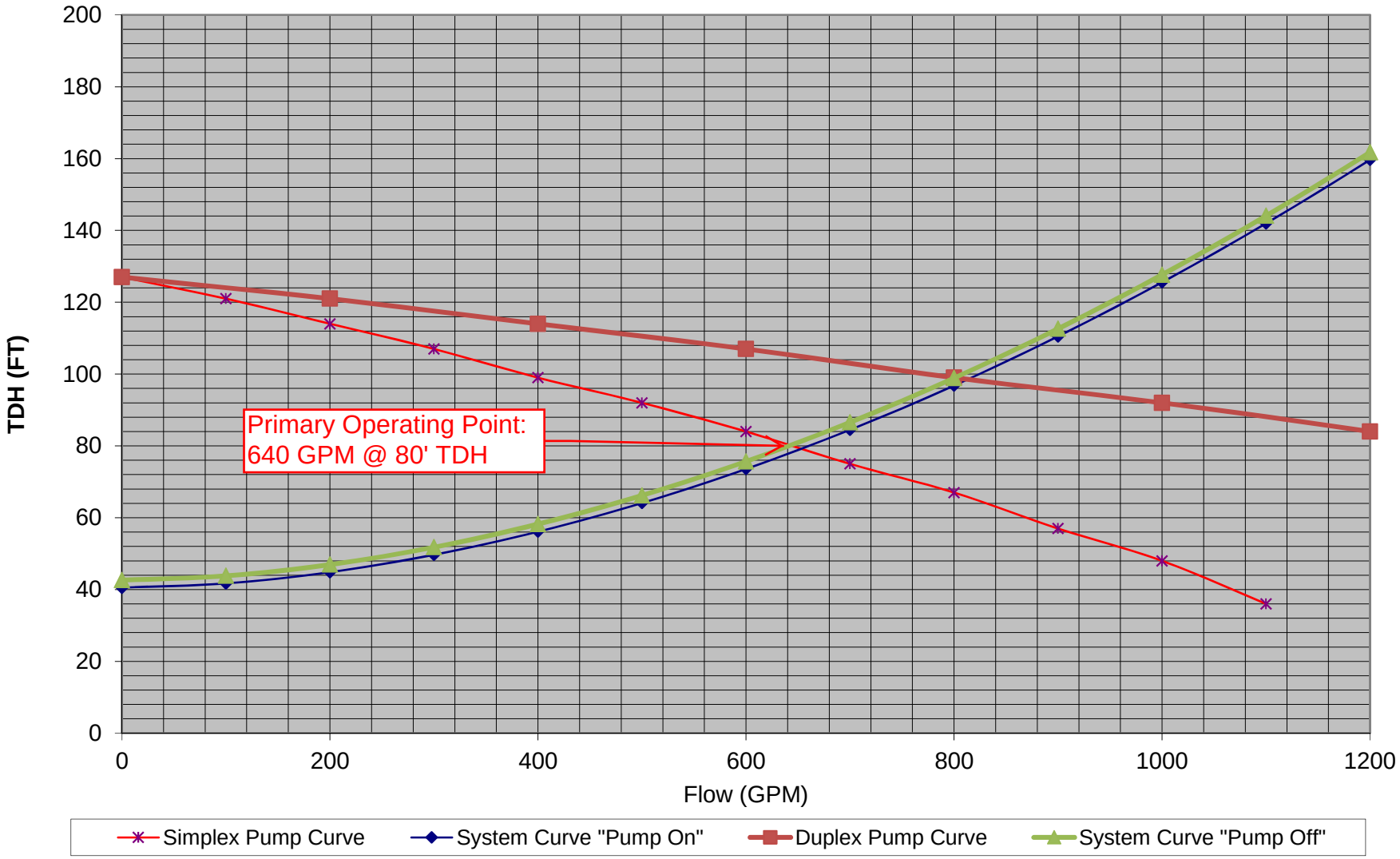
Lift Station No. 4 Pump and System Curves



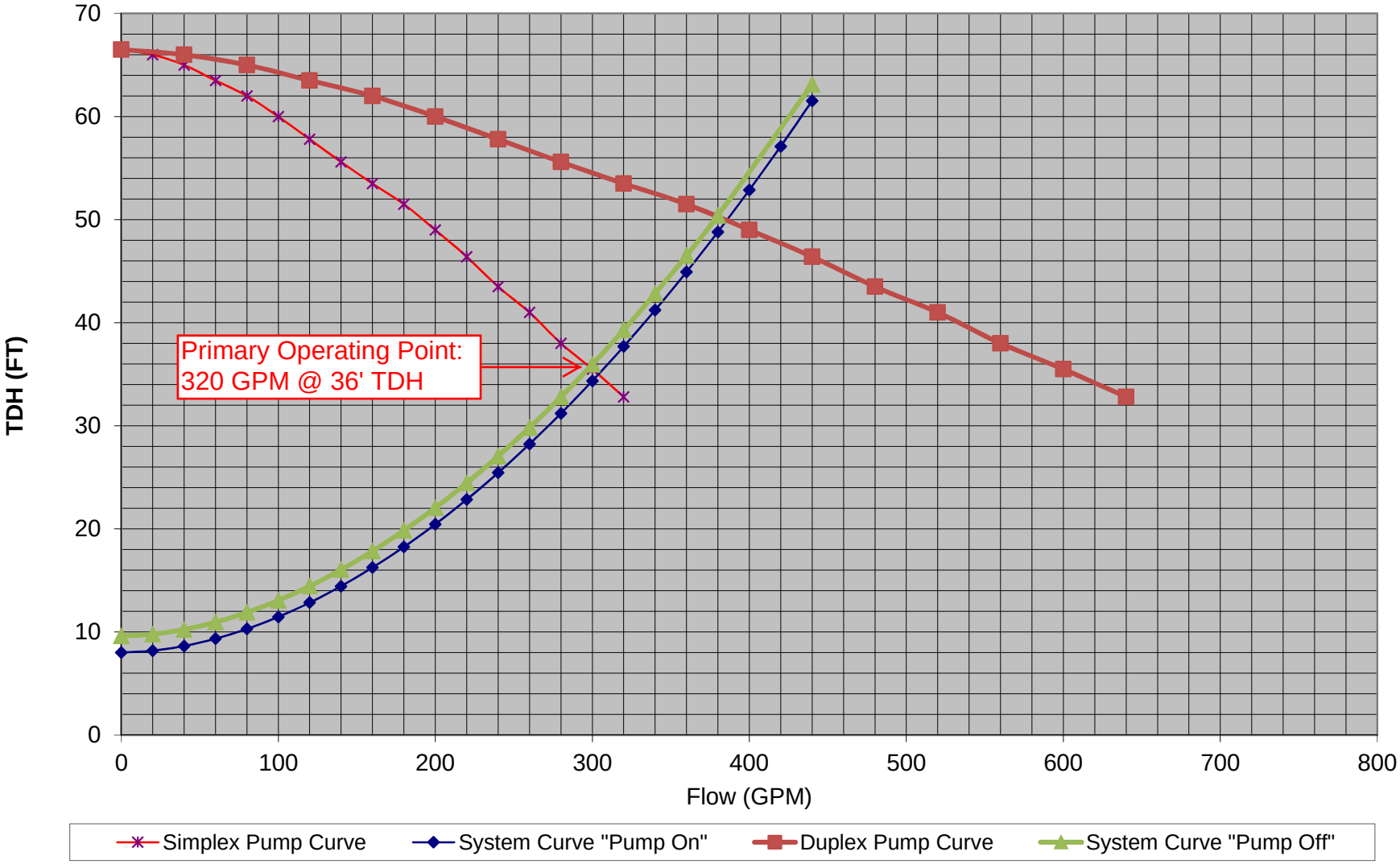
Lift Station No. 5 Pump and System Curve



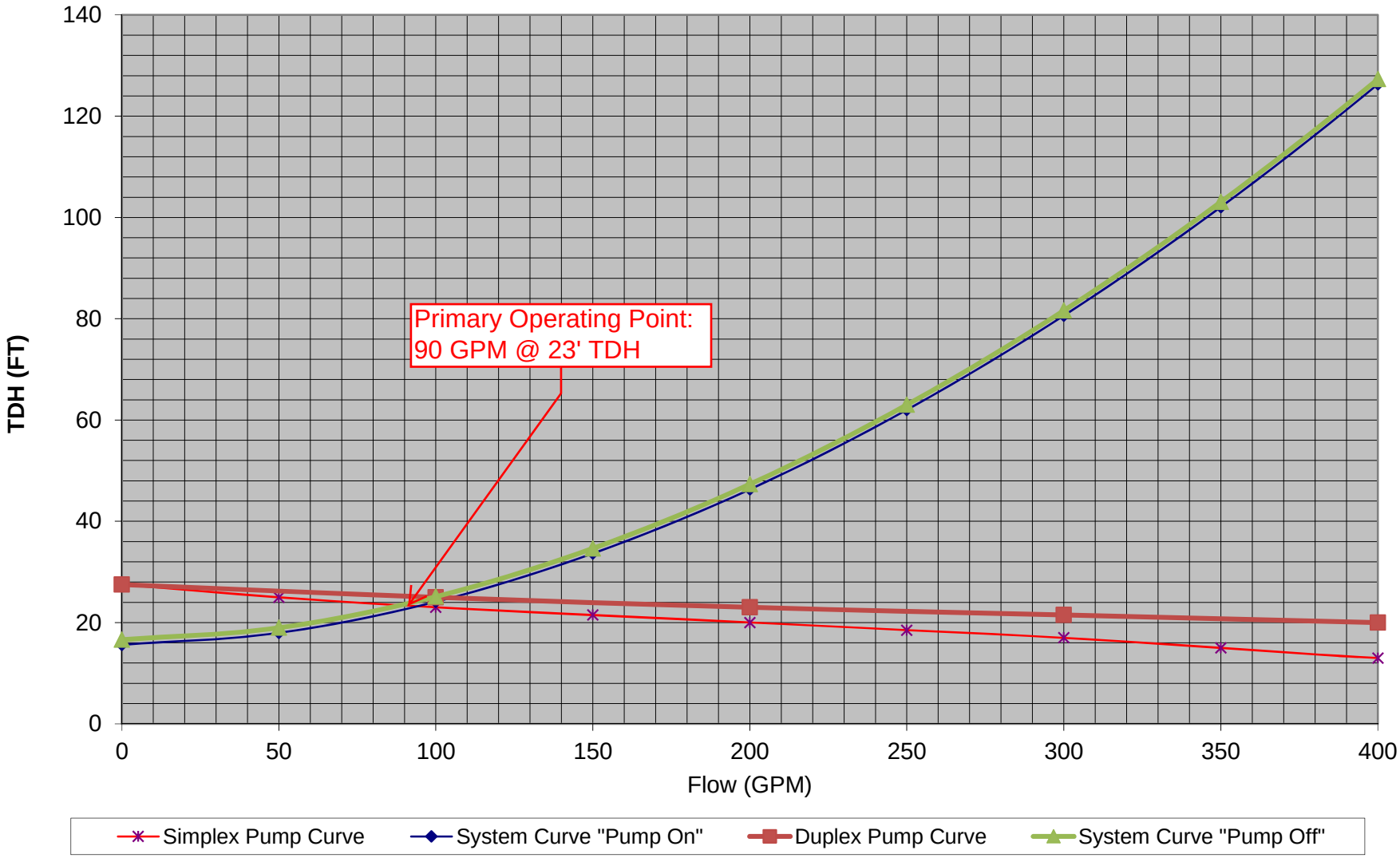
Lift Station No. 6 Pump and System Curves



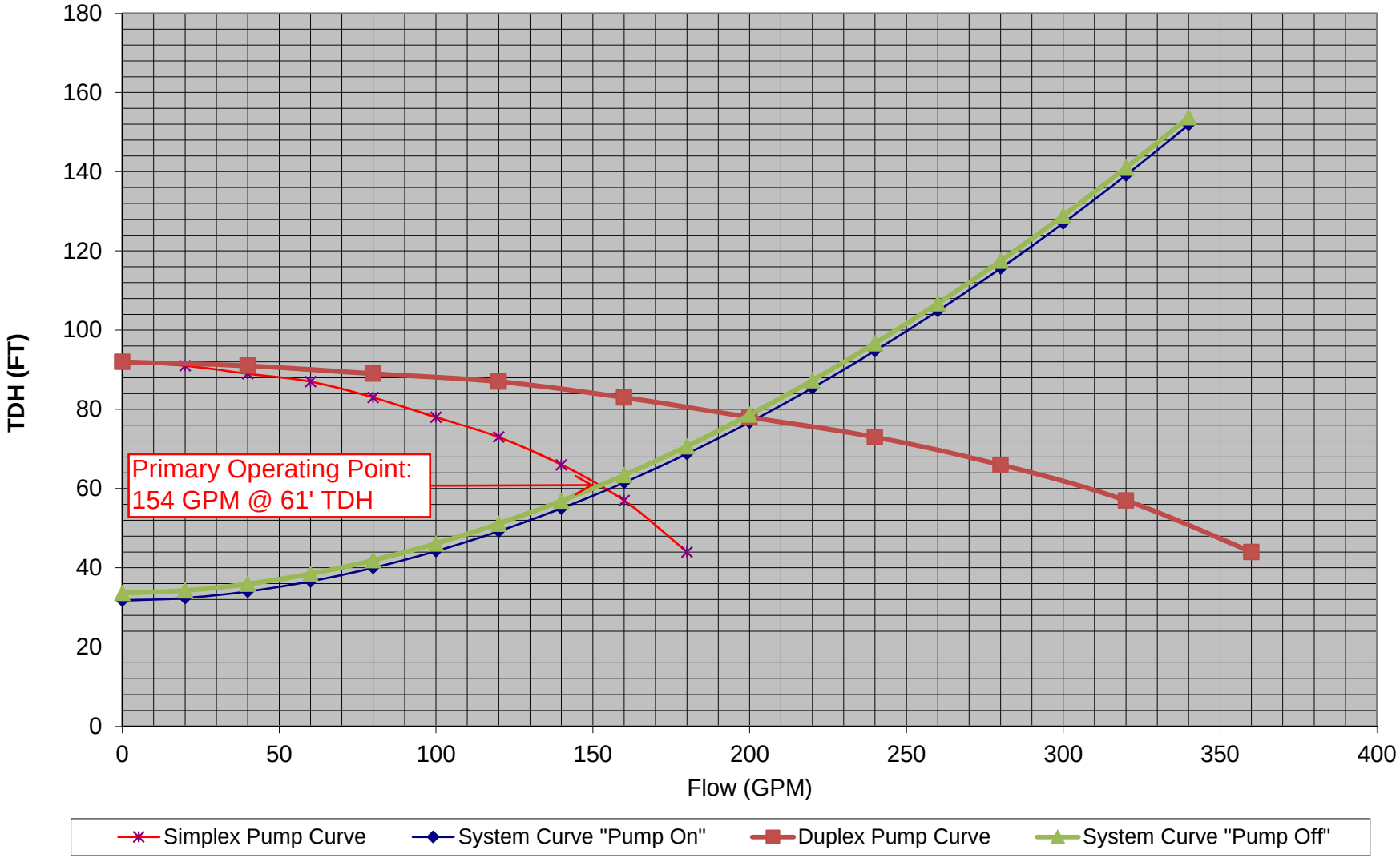
Lift Station No. 7 Pump and System Curves



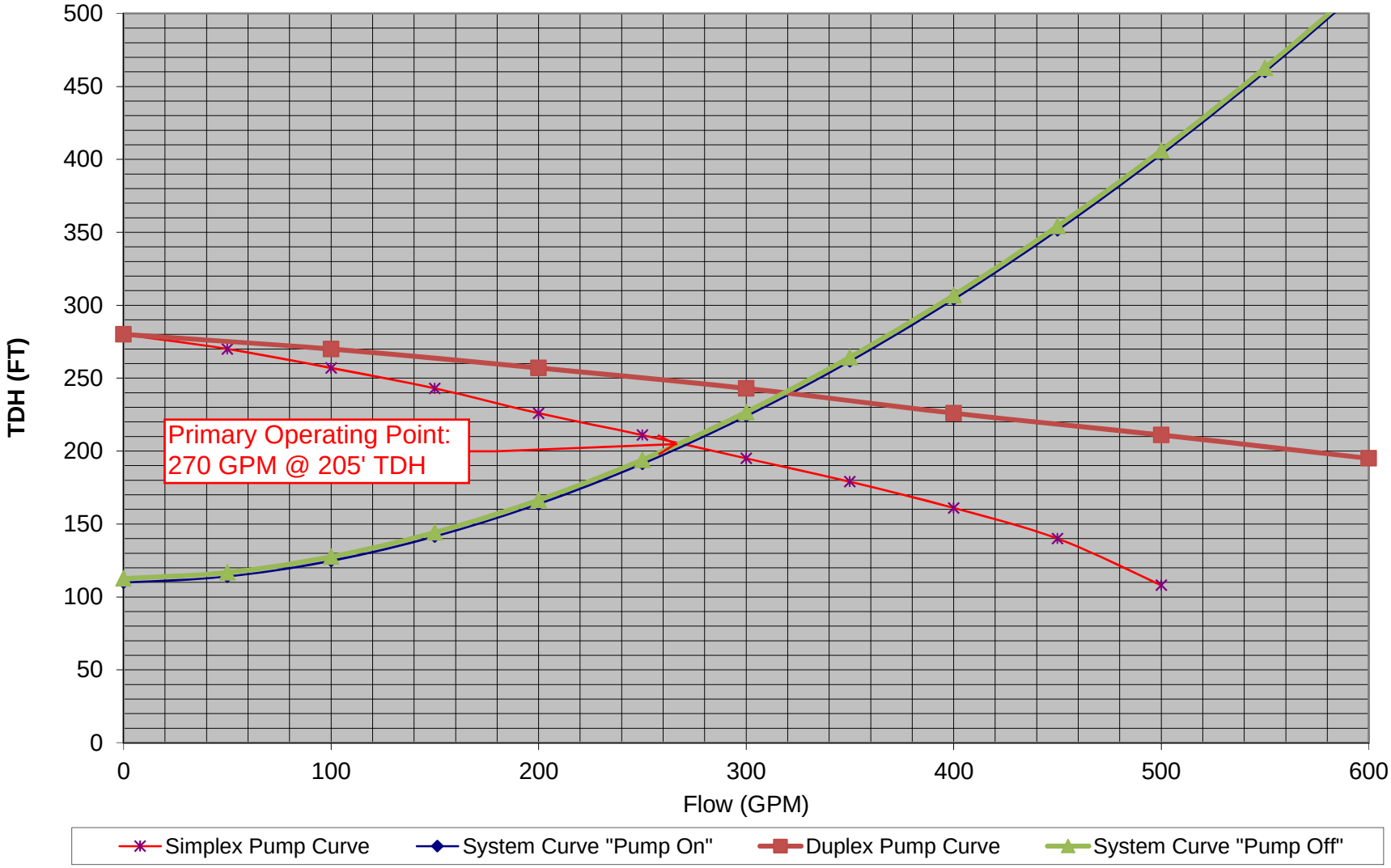
Lift Station No. 9 Pump System Curves



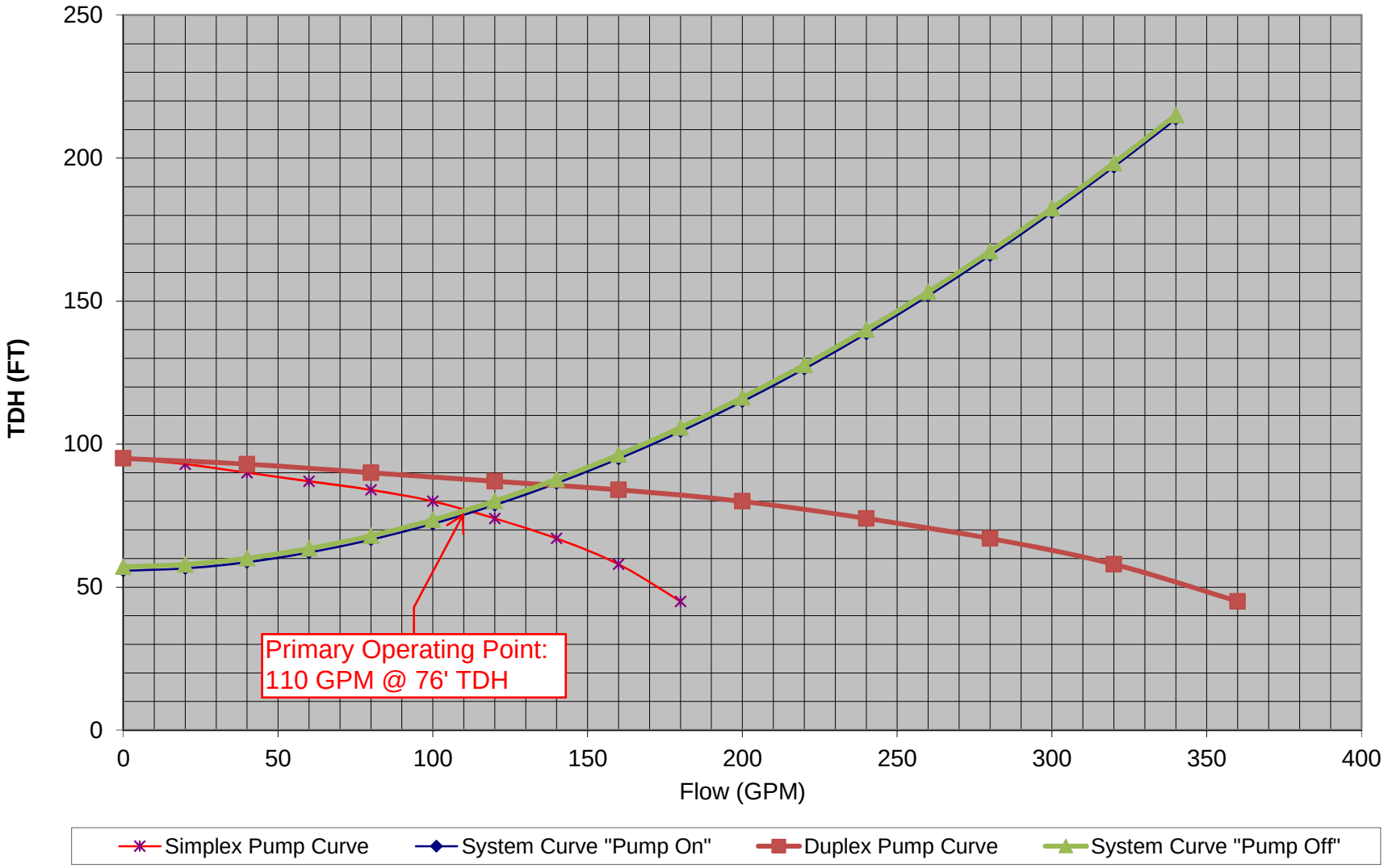
Lift Station No. 11 Pump and System Curves



Lift Station No. 13 Pump System Curves

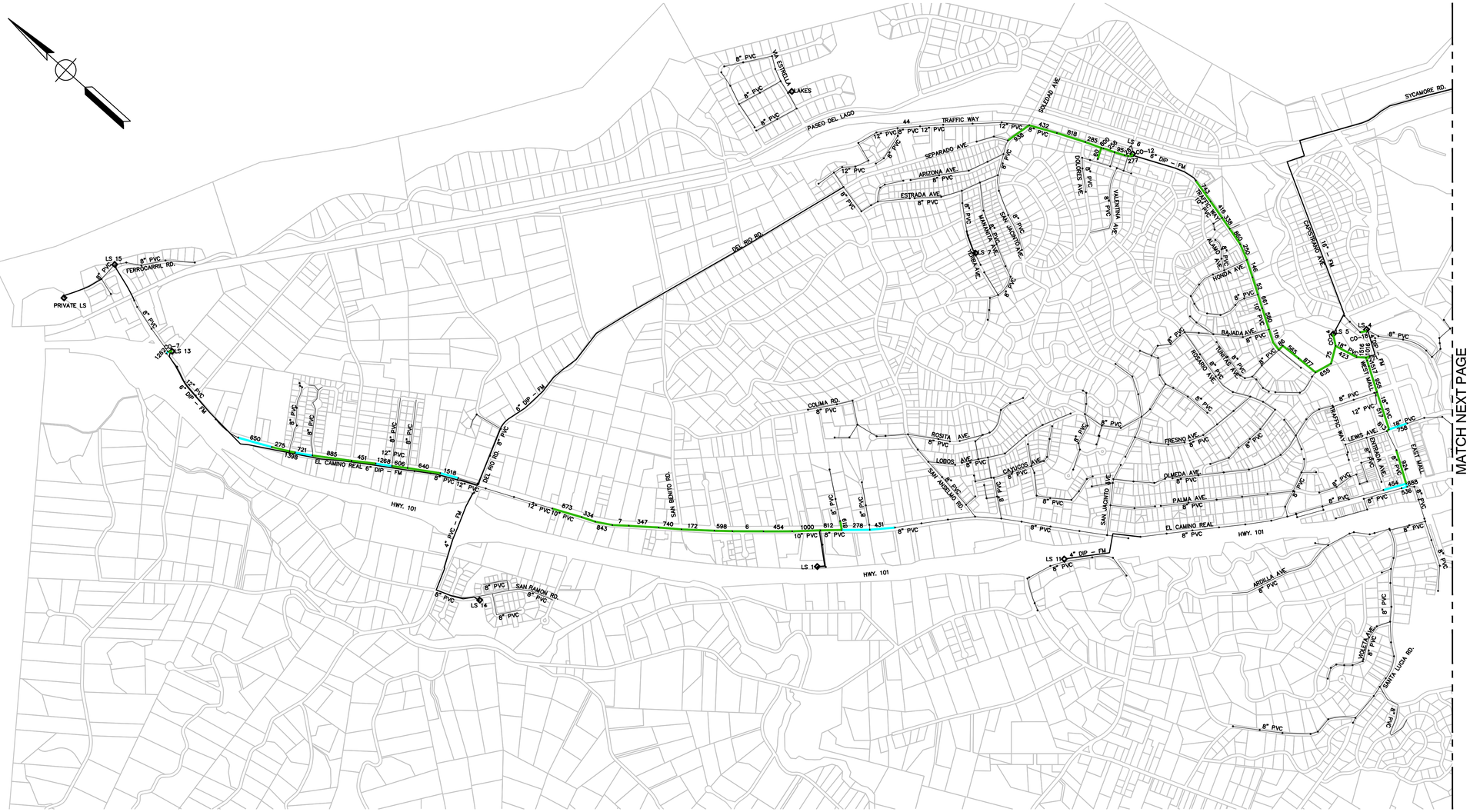


Lift Station No. 14 Pump System Curves



APPENDIX F

Gravity Collection System Hydraulic Deficiency Map



750' 0' 750'
1" = 750'

ASSUMPTIONS MADE TO DEVELOP A WORKING HYDRAULIC MODEL WITH SEWERCAD

- FOR MANHOLES WITH MANHOLE AND RIM AND INVERT ELEVATIONS NOT INCLUDED IN THE GIS MODEL, ELEVATIONS WERE ASSUMED BASED ON GROUND ELEVATION FROM THE CITY OF ATASCADERO'S CONTOUR MAP DATED FEBRUARY 2009
- DEMAND FLOWS WERE INPUT INTO THE MODEL, INCLUDING LOCATIONS AND QUANTITY, AS PROVIDED BY MKN & ASSOCIATES. NO ADDITIONAL FLOWS WERE INCLUDED OR ADDED.
- MANNING'S COEFFICIENT USED THROUGHOUT THE MODEL IS DEPENDENT ON PIPE MATERIAL AS FOLLOWS;
  DIP – 0.015
  PVC – 0.010
  VCP – 0.014
  ACP – 0.011
  UNKNOWN MATERIAL, ASSUMED VCP
- THE MODEL WAS RUN AT STEADY STATE, WITH EACH LIFT STATION OPERATING IN SIMPLEX MODE
- ADDITIONAL STEADY STATE SCENARIOS WERE INCLUDED IN THE HYDRAULIC MODEL WITH EACH LIFT STATION INDIVIDUALLY OPERATING IN DUPLEX MODE.

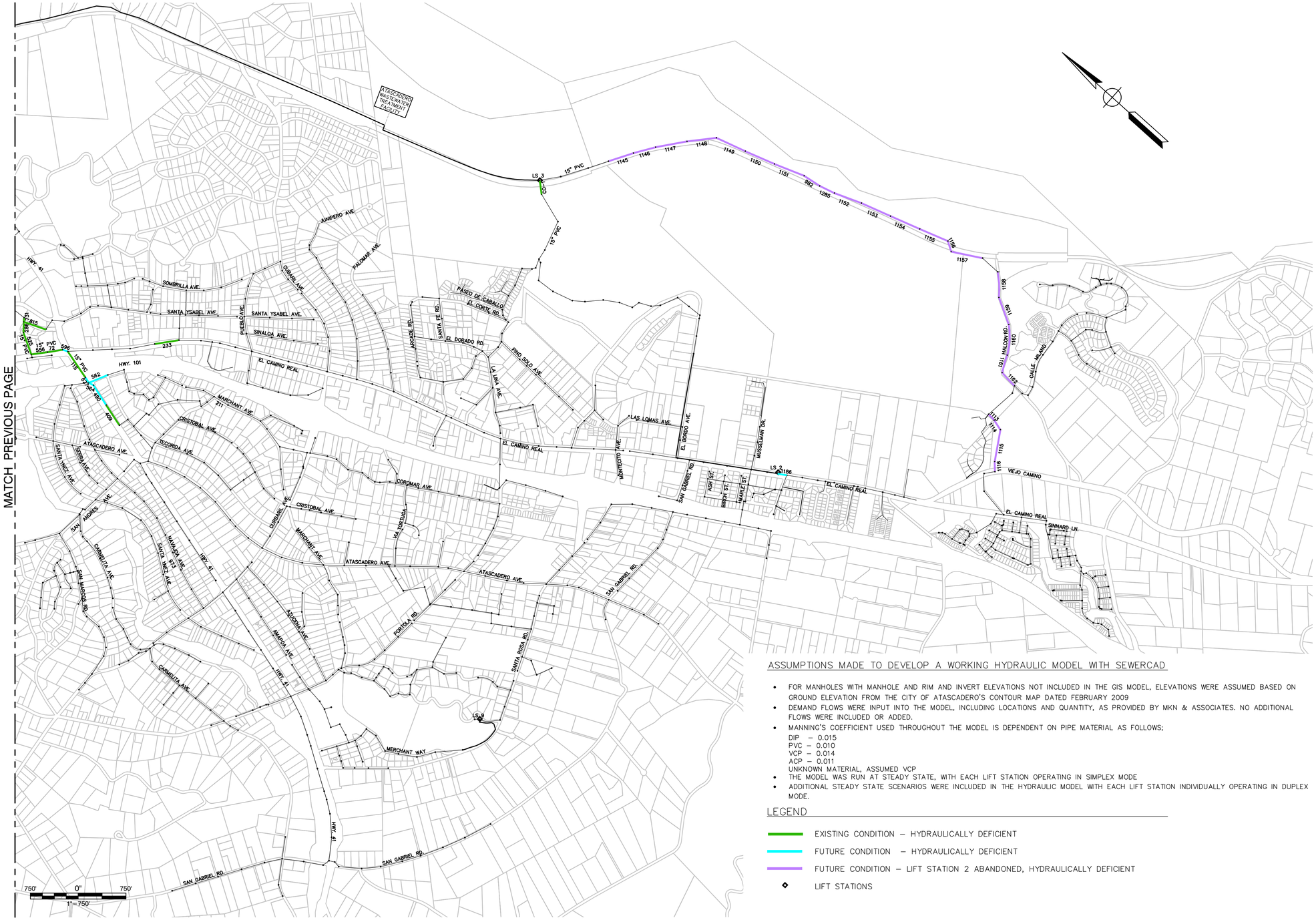
LEGEND

- EXISTING CONDITION – HYDRAULICALLY DEFICIENT
- FUTURE CONDITION – HYDRAULICALLY DEFICIENT
- FUTURE CONDITION – LIFT STATION 2 ABANDONED, HYDRAULICALLY DEFICIENT
- LIFT STATIONS

MNS ENGINEERS INC
ENGINEERING | SURVEYING
CONSTRUCTION MANAGEMENT

811 El Capitan Way, Suite 130
San Luis Obispo, CA 93401
805.787.0326 Phone

APPENDIX F
CITY OF ATASCADERO - COLLECTION SYSTEM MASTER PLAN
GRAVITY SEWER COLLECTION SYSTEM HYDRAULIC DEFICIENCY MAP
SHEET 1



ASSUMPTIONS MADE TO DEVELOP A WORKING HYDRAULIC MODEL WITH SEWERCAD

- FOR MANHOLES WITH MANHOLE AND RIM AND INVERT ELEVATIONS NOT INCLUDED IN THE GIS MODEL, ELEVATIONS WERE ASSUMED BASED ON GROUND ELEVATION FROM THE CITY OF ATASCADERO'S CONTOUR MAP DATED FEBRUARY 2009
- DEMAND FLOWS WERE INPUT INTO THE MODEL, INCLUDING LOCATIONS AND QUANTITY, AS PROVIDED BY MKN & ASSOCIATES. NO ADDITIONAL FLOWS WERE INCLUDED OR ADDED.
- MANNING'S COEFFICIENT USED THROUGHOUT THE MODEL IS DEPENDENT ON PIPE MATERIAL AS FOLLOWS;
  DIP – 0.015
  PVC – 0.010
  VCP – 0.014
  ACP – 0.011
  UNKNOWN MATERIAL, ASSUMED VCP
- THE MODEL WAS RUN AT STEADY STATE, WITH EACH LIFT STATION OPERATING IN SIMPLEX MODE
- ADDITIONAL STEADY STATE SCENARIOS WERE INCLUDED IN THE HYDRAULIC MODEL WITH EACH LIFT STATION INDIVIDUALLY OPERATING IN DUPLEX MODE.

LEGEND

- EXISTING CONDITION – HYDRAULICALLY DEFICIENT
- FUTURE CONDITION – HYDRAULICALLY DEFICIENT
- FUTURE CONDITION – LIFT STATION 2 ABANDONED, HYDRAULICALLY DEFICIENT
- LIFT STATIONS

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APPENDIX F
CITY OF ATASCADERO - COLLECTION SYSTEM MASTER PLAN
GRAVITY SEWER COLLECTION SYSTEM HYDRAULIC DEFICIENCY MAP
SHEET 2

APPENDIX G

Hydraulically Deficient Pipe Segments

Existing Condition Collection System Hydraulic Deficiencies								
Label	Slope (ft/ft)	Diameter (in)	Flow (gpm)	d/D (flow depth/ pipe diameter)	d/D = 0.75 Capacity (gpm)	Flow / d/D = 0.75 Capacity (%)	Recommended Pipe Size Diameter (in)[1]	Flow / 75% Capacity (Recommended Pipe Size) (%)
6	0.002	10	639	0.996	556	115	N/A	115[3]
7	0.002	10	648	0.996	540	120	N/A	120[3]
52	0.002	10	718	0.996	448	160	12	70
60	0.025	8	3	0.855	1,117	1[2]	N/A	0.2
72	0.003	15	1,527	0.808	1,444	106	18	46
75	0.005	12	903	0.790	1,518	60[2]	18	20
86	0.002	12	898	1.000	647	139	18	34
95	0.007	8	862	0.960	588	147	12	50
115	0.001	15	1,061	0.800	748	142	18	62
116	0.002	12	870	1.000	650	134	18	32
146	0.002	10	715	0.996	452	158	12	69
172	0.002	10	640	0.996	567	113	N/A	113[3]
233	0.001	10	422	0.756	271	156	12	68
250	0.002	10	698	0.996	442	158	12	69
256	0.003	8	853	surcharge	395	216	12	73
271	0.011	18	1,992	1.000	4,674	43[2]	N/A	43
275	0.001	12	757	0.790	574	132	N/A	132[3]
277	0.012	8	866	0.960	772	112	12	38
285	0.002	8	851	surcharge	302	282	12	96
286	0.011	15	1,538	0.792	2,817	55[2]	18	24
287	0.02	8	862	0.960	992	87[2]	12	29

338	0.002	10	694	0.996	448	155	12	68
344	0.002	10	651	0.996	615	106	N/A	106^3
347	0.002	10	648	0.996	566	114	N/A	114^3
409	0.004	10	467	0.780	589	79^2	12	35
416	0.002	10	691	0.996	432	160	12	70
423	0.003	18	2,232	1.000	3,557	63^2	N/A	63
432	0.056	8	846	0.960	1,662	51^2	12	17
451	0.004	12	738	0.760	1,250	59^2	N/A	59
459	0.002	10	635	0.996	578	110	N/A	110^3
517	0.004	18	1,940	0.813	2,633	74^2	N/A	74
525	0.002	15	1,538	0.800	1,233	125	18	55
556	0.005	15	1,532	0.880	1,817	84^2	18	37
565	0.002	12	898	1.000	633	142	18	34
580	0.004	10	736	0.996	552	133	12	59
598	0.002	10	640	0.996	574	111	N/A	111^3
606	0.001	12	727	0.760	471	154	N/A	154^3
640	0.002	12	708	0.770	927	76^2	N/A	76
655	0.003	12	903	0.800	745	121	18	29
661	0.003	10	733	0.996	478	153	12	67
731	0.002	15	1,599	0.944	1,055	152	18	31
740	0.002	10	645	0.996	584	110	N/A	110^3
743	0.002	10	688	0.996	427	161	12	71
800	0.008	8	853	surcharge	614	139	12	47
812	0.016	8	210	surcharge	637	33^2	N/A	33

813	0.112	8	335	0.810	1,687	20[2]	N/A	5
815	0.001	8	61	surcharge	186	33[2]	18	3
818	0.021	8	850	surcharge	1,029	83[2]	12	28
819	0.002	8	10	surcharge	203	5[2]	N/A	5
843	0.002	10	649	0.996	568	114	N/A	114[3]
860	0.002	10	695	0.996	447	155	12	68
873	0.001	10	651	0.828	366	178	N/A	178[3]
877	0.002	12	898	1.000	664	135	18	33
885	0.001	12	738	0.760	524	141	N/A	141[3]
924	0.005	8	312	0.780	352	89[2]	N/A	89
938	0.037	8	352	0.780	1,363	26[2]	N/A	26
955	0.004	18	1,986	1.000	2,747	72[2]	N/A	72
1000	0.004	10	635	0.996	831	76[2]	N/A	76
1016	0.011	8	240	surcharge	527	46[2]	12	11
1398	0.008	12	847	0.790	1,909	44[2]	N/A	44
1516	0.009	18	2,232	1.000	4,064	55[2]	N/A	55
1517	0.005	18	1,992	1.000	3,198	62[2]	N/A	62
CO-1	0.002	15	850	1.000	1,682	51[2]	N/A	51
CO-12	0.029	8	866	0.780	1,204	72[2]	12	24
CO-18	0.005	12	19	0.900	1,461	1[2]	N/A	1
CO-4	0.008	21	3,136	1.000	8,317	38[2]	N/A	38
CO-7	0.003	12	795	0.890	1,077	74[2]	N/A	74

[1] Pipe Segment Indicated with N/A indicate d/D issues resolved by increased capacity in downstream segments or methods other than increasing pipe size as indicated by notations.

[2] Pipe identified as deficient (d/D > 0.75) due to downstream backwater effects. Listed d/D = 0.75 capacity assumes no tail water effects.

[3] Pipe segment deficient when two pumps are discharging from Lift Station 1. Replacing pumps at lift station No. 1 is recommended to relieve this deficiency.

Future Condition Collection System Hydraulic Deficiencies								
Label	Slope (ft/ft)	Diameter (in)	Flow (gpm)	d/D (flow depth/ pipe diameter)	d/D = 0.75 Capacity (gpm)	Flow / d/D = 0.75 Capacity (%)	Recommended Pipe Size Diameter (in)[1]	Flow / 75% Capacity (Recommended Pipe Size) (%)
278	0.007	8	215	surcharge	422	51[2]	N/A	51
431	0.004	8	208	0.795	319	65[2]	N/A	65
454	0.019	8	313	0.795	699	45[2]	N/A	45
490	0.002	10	516	0.792	448	115	12	51
536	0.010	8	87	surcharge	503	17[2]	N/A	17
562	0.003	12	522	0.790	804	65[2]	N/A	65
564	0.047	10	516	0.768	1,981	26[2]	12	11
596	0.010	15	1,652	0.936	2,673	62[2]	18	27
627	0.009	15	1,130	0.824	2,504	45[2]	18	20
650	0.002	12	1,049	0.820	931	113	N/A	113[3]
721	0.004	12	1,030	0.810	1,276	81[2]	N/A	81
758	0.002	18	1,777	0.767	2,033	87[2]	N/A	87
888	0.002	8	3	0.975	241	1[2]	N/A	1
1186	0.004	8	295	0.795	306	97[2]	10	38
1262	0.019	12	585	0.820	2,854	20[2]	N/A	20

1268	0.003	12	1,005	1.000	1,041	97[2]	N/A	97
1518	0.005	12	462	0.800	1,482	31[2]	N/A	31

[1] Pipe Segment Indicated with N/A indicate d/D issues resolved by increased capacity in downstream segments or methods other than increasing pipe size as indicated by notations.

[2] Pipe identified as deficient (d/D > 0.75) due to downstream backwater effects. Listed d/D = 0.75 capacity assumes no tail water effects.

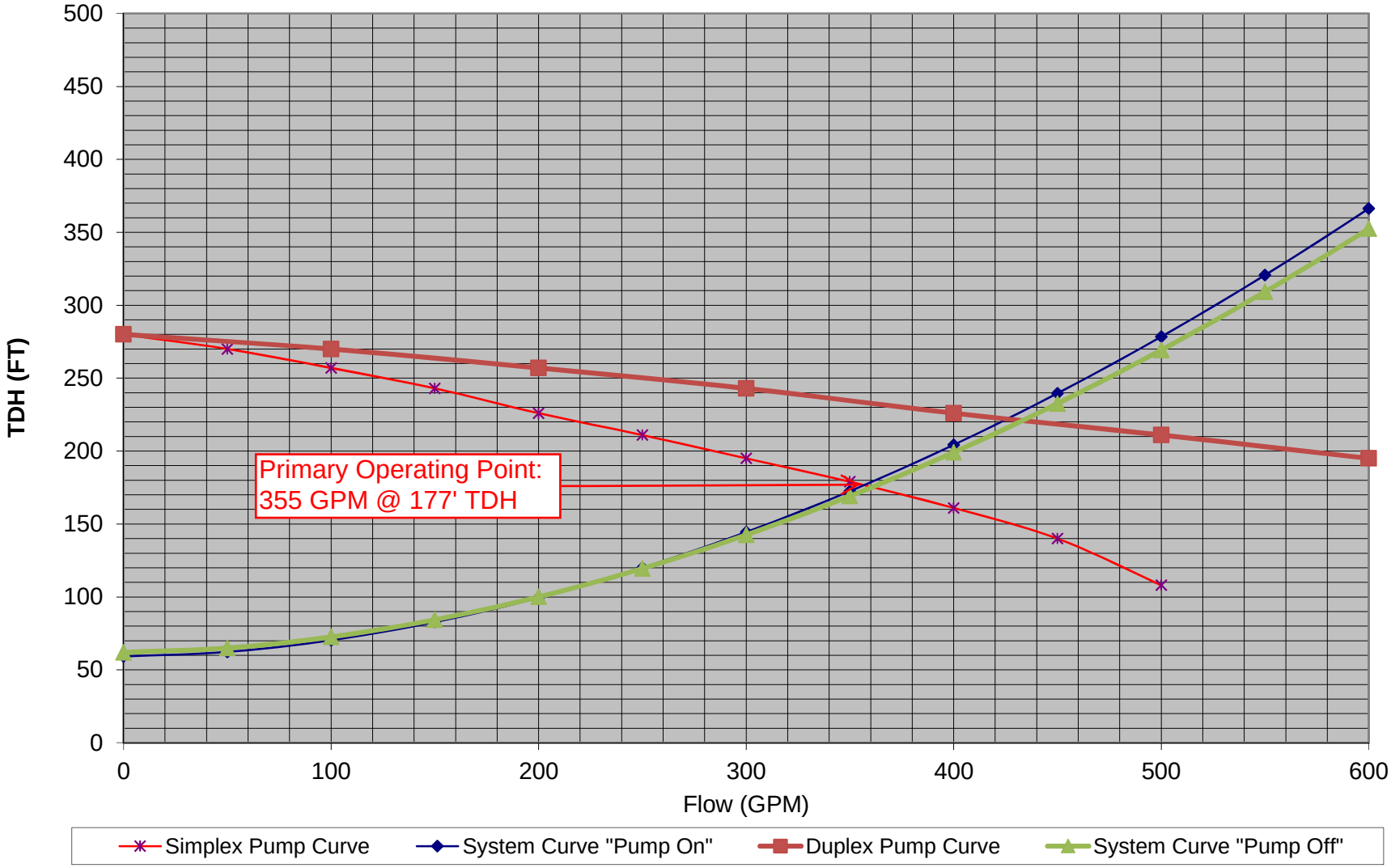
[3] Pipe segment deficient when two pumps are discharging from Lift Station 1. Replacing pumps at lift station No. 1 is recommended to relieve this deficiency.

Future Condition Collection System Hydraulic Deficiencies, Abandoned Lift Station 2								
Label	Slope (ft/ft)	Diameter (in)	Flow (gpm)	d/D (flow depth/ pipe diameter)	d/D = 0.75 Capacity (gpm)	Flow / d/D = 0.75 Capacity (%)	Recommended Pipe Size Diameter (in)	Flow / 75% Capacity (Recommended Pipe Size) (%)
982	0.0020233	12	950	0.84	776	135	18	61
1113	0.0039841	10	626	0.78	525	103	12	57
1114	0.0034193	10	626	0.79	542	112	15	62
1115	0.0026517	10	626	0.74	442	127	15	70
1116	0.0030573	10	626	0.83	475	118	15	65
1145	0.0019922	12	950	0.75	776	136	18	67
1146	0.0020006	12	950	0.84	778	136	18	67
1147	0.0021774	12	950	0.82	813	131	18	64
1148	0.0024107	12	950	0.78	854	124	18	61
1149	0.0022013	12	950	0.78	816	130	18	61
1150	0.0020036	12	950	0.82	778	136	18	67
1151	0.0019952	12	950	0.84	778	136	18	67
1152	0.0020062	12	950	surcharge	778	136	18	67
1153	0.0020016	12	950	surcharge	778	136	18	67
1154	0.0019956	12	950	surcharge	778	136	18	67
1155	0.0022033	12	950	surcharge	778	130	18	67
1156	0.0035735	12	950	surcharge	1040	102	15	50
1157	0.0028104	12	950	0.88	922	115	15	63
1158	0.0022483	12	949	0.84	818	128	18	63
1159	0.0020102	12	949	0.81	778	136	18	67
1160	0.0019975	12	949	0.84	778	136	18	67
1161	0.0023125	12	949	0.81	836	127	18	63
1162	0.0025804	12	949	0.76	884	120	15	59
1189	0.0019873	10	395	0.82	211	188	12	51
1230	0.0043029	10	521	0.65	402	130	12	46
1283	0.0024296	10	377	0.77	205	184	12	44
1285	0.0019402	12	950	0.92	767	138	18	71

APPENDIX H

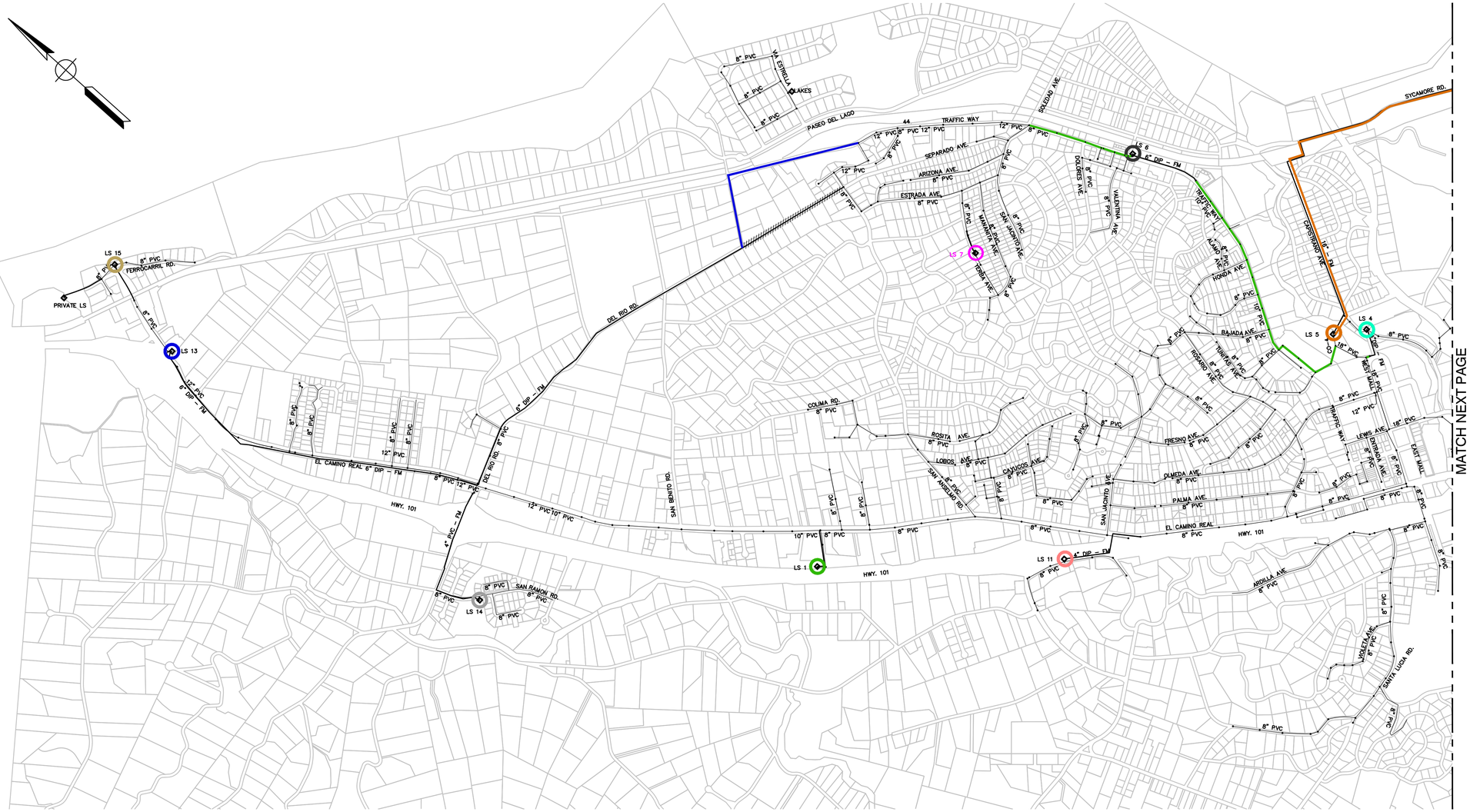
Realigned Lift Station No. 13 Pump and System Curve

Realigned Lift Station No. 13 Pump System Curves



APPENDIX I

Collection System Capital Improvement Plan



750' 0' 750'
1"=750'

LEGEND

- EWWLSCIP–1 – LIFT STATION NO. 1 SITE IMPROVEMENT
- EWWLSCIP–2 – LIFT STATION NO. 2 REPLACEMENT
- EWWLSCIP–3 – LIFT STATION NO. 3 SITE IMPROVEMENTS
- EWWLSCIP–4 – LIFT STATION NO. 4 SITE IMPROVEMENTS
- EWWLSCIP–5 – LIFT STATION NO. 5 UPGRADES
- EWWLSCIP–6 – LIFT STATION NO. 6 SITE IMPROVEMENTS
- EWWLSCIP–7 – LIFT STATION NO. 7 ABANDONMENT AND GRAVITY CONVERSION
- EWWLSCIP–8 – LIFT STATION NO. 9 SITE IMPROVEMENTS
- EWWLSCIP–9 – LIFT STATION NO. 11 IMPROVEMENTS
- EWWLSCIP–10 – LIFT STATION 13 HYDRAULIC IMPROVEMENTS
- EWWLSCIP–11 – LIFT STATION NO. 14 SITE IMPROVEMENTS AND ELECTRICAL UPGRADES
- EWWLSCIP–12 – LIFT STATION NO. 15 SAFETY IMPROVEMENTS
- EWWCSCIP–1 – TRAFFIC WAY SEWER IMPROVEMENTS
- EWWCSCIP–2 – HIGHWAY 41 AND EL CAMINO REAL SEWER IMPROVEMENTS
- LIFT STATIONS

NOTE: EWWCSCIP–3 – VARIOUS LOCATIONS SEWER CONDITION IMPROVEMENTS, DOES NOT INCLUDE SPECIFIC PIPE SEGMENTS, AND AS A RESULT IS NOT SHOWN ON THIS FIGURE.

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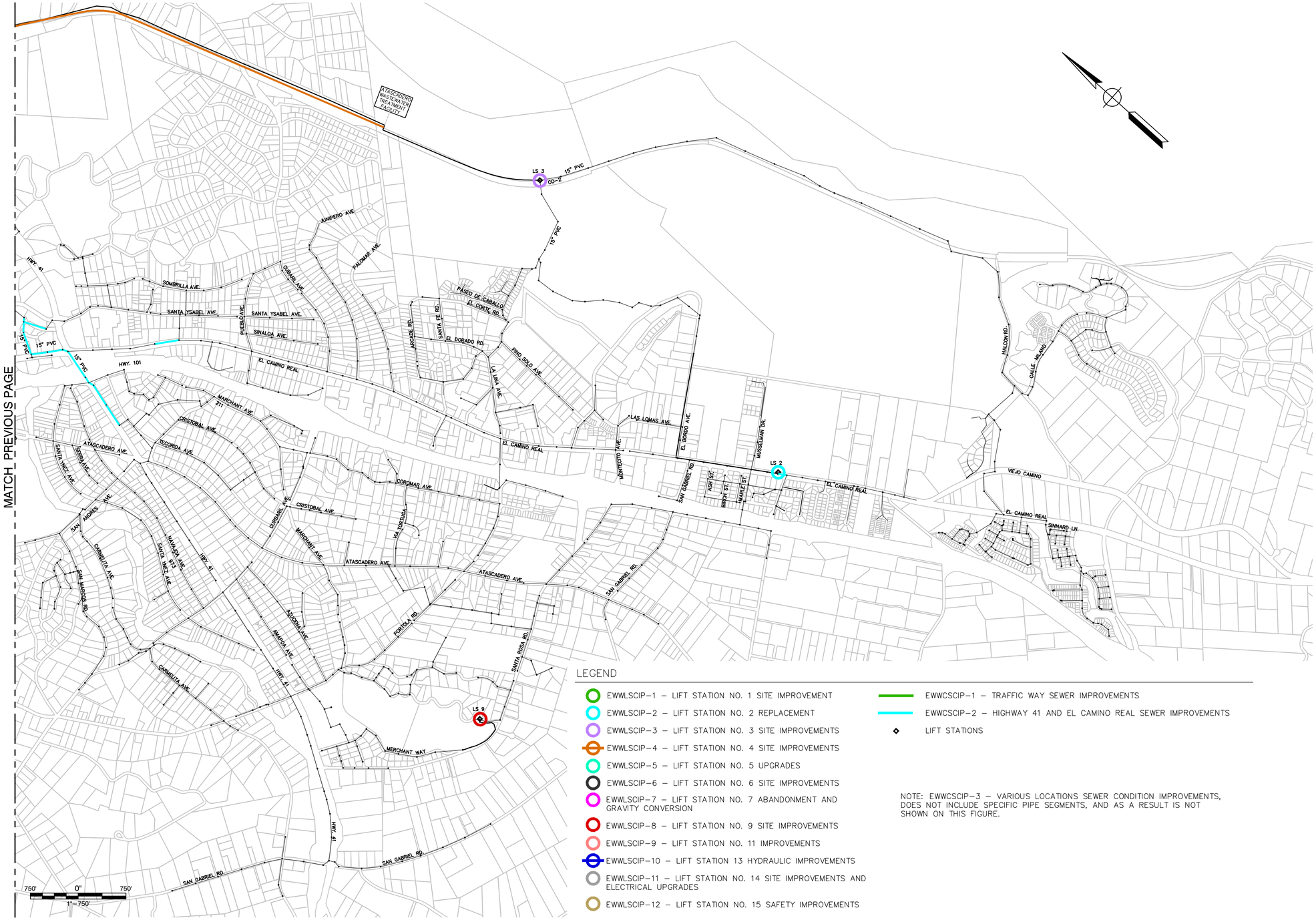
APPENDIX I
CITY OF ATASCADERO - COLLECTION SYSTEM MASTER PLAN
COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN
SHEET 1



LEGEND

- EWWLSCIP–1 – LIFT STATION NO. 1 SITE IMPROVEMENT
- EWWLSCIP–2 – LIFT STATION NO. 2 REPLACEMENT
- EWWLSCIP–3 – LIFT STATION NO. 3 SITE IMPROVEMENTS
- EWWLSCIP–4 – LIFT STATION NO. 4 SITE IMPROVEMENTS
- EWWLSCIP–5 – LIFT STATION NO. 5 UPGRADES
- EWWLSCIP–6 – LIFT STATION NO. 6 SITE IMPROVEMENTS
- EWWLSCIP–7 – LIFT STATION NO. 7 ABANDONMENT AND GRAVITY CONVERSION
- EWWLSCIP–8 – LIFT STATION NO. 9 SITE IMPROVEMENTS
- EWWLSCIP–9 – LIFT STATION NO. 11 IMPROVEMENTS
- EWWLSCIP–10 – LIFT STATION 13 HYDRAULIC IMPROVEMENTS
- EWWLSCIP–11 – LIFT STATION NO. 14 SITE IMPROVEMENTS AND ELECTRICAL UPGRADES
- EWWLSCIP–12 – LIFT STATION NO. 15 SAFETY IMPROVEMENTS
- EWWCSCIP–1 – TRAFFIC WAY SEWER IMPROVEMENTS
- EWWCSCIP–2 – HIGHWAY 41 AND EL CAMINO REAL SEWER IMPROVEMENTS
- LIFT STATIONS

NOTE: EWWCSCIP–3 – VARIOUS LOCATIONS SEWER CONDITION IMPROVEMENTS, DOES NOT INCLUDE SPECIFIC PIPE SEGMENTS, AND AS A RESULT IS NOT SHOWN ON THIS FIGURE.

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APPENDIX I
CITY OF ATASCADERO - COLLECTION SYSTEM MASTER PLAN
COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN
SHEET 2

APPENDIX J

Lift Station Capital Improvement Project Preliminary Cost Estimates

Project: EWWLSCIP-1 - Lift Station No. 1 Site Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Remove Surge Tank (If Not Required), and Surge Suppression Modifications	$25,000
4	Regrade Site and Install Drainage Improvements	$15,000
5	Repave Site	$4,000
6	Install Fence and Gate at Site Entrance	$2,500
7	Replace Pumps	$20,000
8	K-rail Along Freeway Side of Site	$5,000
	Subtotal	**$73,600**
	Construction Contingency (30%)	**$22,080**
	Engineering & Administration (30%)	**$22,080**
	Total	**$117,760**

Project: EWWLSCIP-2 - Reconstruct Lift Station No. 2		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Abandon Existing Lift Station No. 2	$50,000
2	Reconstruct Lift Station No. 2	$500,000
	Subtotal	**$550,000**
	Construction Contingency (30%)	**$165,000**
	Engineering & Administration (30%)	**$165,000**
	Total	**$880,000**

Project: EWWLSCIP-3 - Lift Station 3 Site Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Remove and Replace Existing Retaining Wall	$10,000
4	Concrete Slab	$2,500
5	Local Water Service	$10,000
6	Replace Valve Vault Lid	$15,000
7	Improved Site Lighting	$7,500
	Subtotal	**$47,100**
	Construction Contingency (30%)	**$14,130**
	Engineering & Administration (30%)	**$14,130**
	Total	**$75,360**

Project: EWWLSCIP-4 - Lift Station 4 Site Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100.00
2	Fall Protection Improvements	$2,000.00
3	Recoat Vault Lid	$500
4	Service and Recoat Discharge Piping	$1,500
5	Add Sump Termination Panel	$10,000
6	Repair Wetwell in Valve Vault	$800
	Subtotal	**$14,900**
	Construction Contingency (30%)	**$4,470**
	Engineering & Administration (30%)	**$4,470**
	Total	**$23,840**

Project: EWWLSCIP-6 - Lift Station 6 Site Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Man Gate	$750
4	Bollards (4)	$1,500
	Subtotal	**$4,350**
	Construction Contingency (30%)	**$1,305**
	Engineering & Administration (30%)	**$1,305**
	Total	**$6,960**

Project: EWWLSCIP-7 - Lift Station 7 Abandonment & Gravity Conversion		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Abandon Lift Station No. 7, and Convert to Gravity	$15,000
2	Directionally Drill 300' 8" Sewer Main	$90,000
3	New Manhole and Connections	$10,000
	Subtotal	**$115,000**
	Construction Contingency (30%)	**$34,500**
	Engineering & Administration (30%)	**$34,500**
	Total	**$184,000**

Project: EWWLSCIP-8 - Lift Station 9 Site Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Site Safety Improvements	$2,500
	Subtotal	**$4,600**
	Construction Contingency (30%)	**$1,380**
	Engineering & Administration (30%)	**$1,380**
	Total	**$7,360**

Project: EWWLSCIP-9 - Lift Station 11 Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Permanent Above Grade Bypass and Pump Connections	$25,000
4	Replace Valve Vault Lid	$12,000
	Subtotal	**$39,100**
	Construction Contingency (30%)	**$11,730**
	Engineering & Administration (30%)	**$11,730**
	Total	**$62,560**

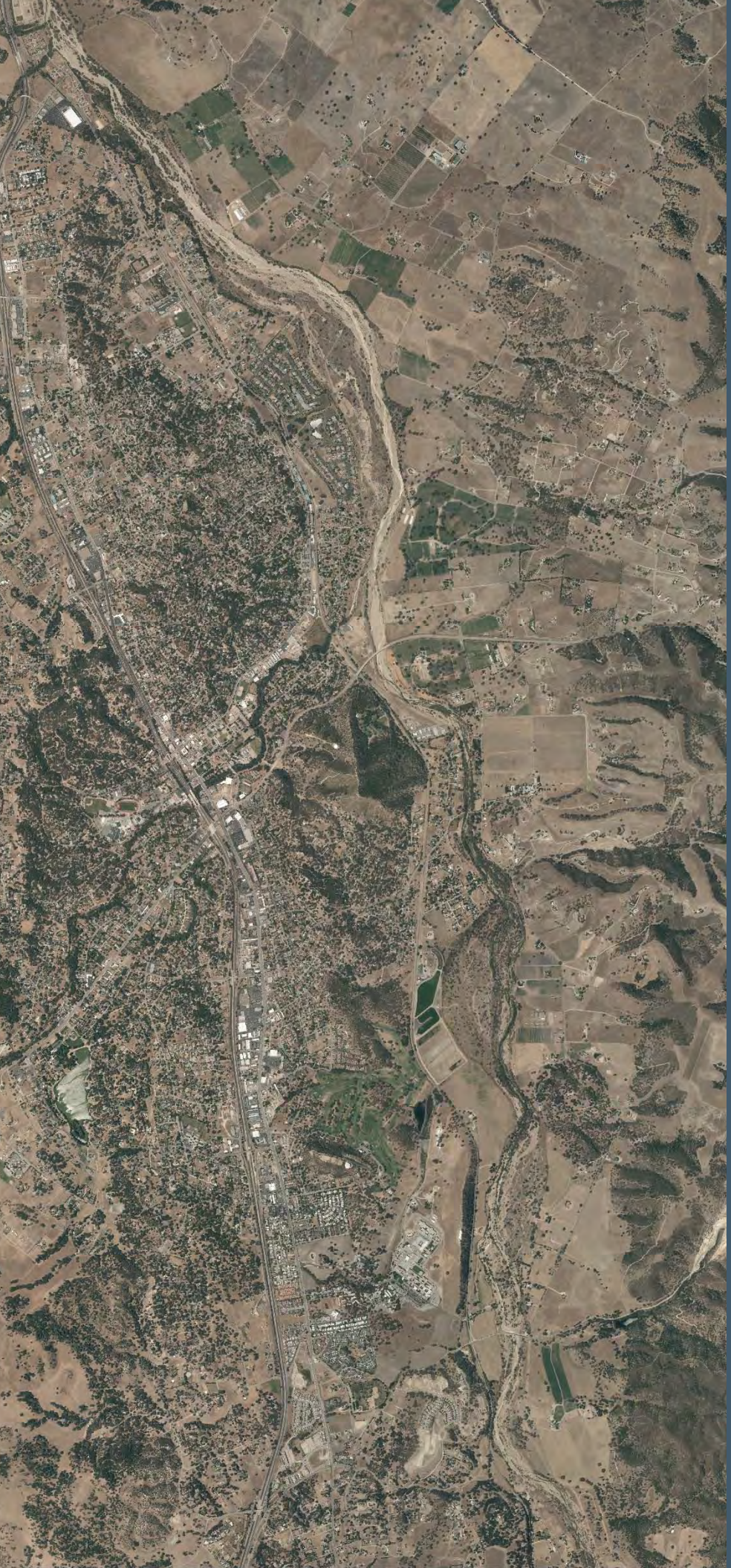
Project: EWWLSCIP-10 - Lift Station 13 Site and Hydraulic Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Remove Lime Dosing Facilities	$2,500
4	Piping Insulation	$500
5	Replace and Reconfigure Wetwell Lid and Access Hatches	$40,000
6	Recoat Interior of Wetwell	$20,000
7	Install Sump Termination Panel	$10,000
8	Site Drainage Improvements	$1,500
9	Remove Surge Tank (If Not Required), or Recoat	$25,000
10	2700 LF 8-inch Ductile Iron Force Main @ $130/LF	$351,000
11	Increase Lift Station Discharge Piping Size From 3" to 6"	$50,000
12	Abandon 1,600 LF Ductile Iron Force Main	$2,500
13	Transition Manhole w/ Vortex Flow Insert	$15,000
14	Bypass Pumping During Construction	$15,000
	Subtotal	**$535,100**
	Construction Contingency (30%)	**$160,530**
	Engineering & Administration (30%)	**$160,530**
	Total	**$856,160**

Project: EWWLSCIP-11 - Lift Station 14 Site Improvements and Electrical Upgrades		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
3	Remove Curb, and Replace Concrete Slab	$10,000
4	Replace Valve Box Lids	$150
5	Electrical/Lighting Improvements	$15,000
6	Install Sump Termination Panel	$10,000
7	Service Check Valves	$1,000
	Subtotal	**$37,250**
	Construction Contingency (30%)	**$11,175**
	Engineering & Administration (30%)	**$11,175**
	Total	**$59,600**

Project: EWWLSCIP-12 - Lift Station 15 Safety Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Confined Space Signage	$100
2	Fall Protection Improvements	$2,000
	Subtotal	**$2,100**
	Construction Contingency (30%)	**$630**
	Engineering & Administration (30%)	**$630**
	Total	**$3,360**

Project: FWWLSCIP-1 - Lift Station 6 Future Capacity Improvements		
Item No.	**Item Description**	**Opinion of Cost ($)**
1	Replace Lift Station Pumps	$40,000
	Subtotal	**$40,000**
	Construction Contingency (30%)	**$12,000**
	Engineering & Administration (30%)	**$12,000**
	Total	**$64,000**

EEECSCP-1, 2 & 3								
Project	**Project Name**	**Segment**	**Existing Size**	**Proposed Size**	**Length**	**Unit Cost**	**Base Opinion of Cost ($)**	**Escalated Opinion of Cost ($)**
EWWCSCIP-1	Traffic Way Sewer Improvements	4266 LF 8" Gravity Sewer 2284 LF 10" Gravity Sewer 2374 LF 12" Gravity Sewer 483 LF 18" Gravity Sewer	Peak Flows in Existing Sewers Exceed Capacity of System		3824 LF 15" Gravity Sewer 1460 LF 18" Gravity Sewer		$1,096,037	**$1,753,658**
		800	8	12	33	195	$6,435	$10,296
		287	8	12	46	195	$9,048	$14,477
		277	8	12	50	195	$9,770	$15,631
		1016	8	12	54	195	$10,511	$16,817
		95	8	12	144	195	$28,041	$44,866
		256	8	12	159	195	$31,083	$49,733
		338	10	12	183	195	$35,705	$57,127
		661	10	12	197	195	$38,396	$61,433
		285	8	12	230	195	$44,792	$71,666
		250	10	12	231	195	$45,006	$72,010
		146	10	12	249	195	$48,497	$77,594
		52	10	12	249	195	$48,516	$77,626
		860	10	12	254	195	$49,569	$79,310
		416	10	12	273	195	$53,255	$85,207
		580	10	12	301	195	$58,734	$93,974
		743	10	12	347	195	$67,704	$108,326
		432	8	12	393	195	$76,538	$122,460
		818	8	12	407	195	$79,424	$127,078
		CO-12	8	12	24	195	$4,641	$7,426
		86	12	18	79	240	$18,936	$30,298
		655	12	18	243	240	$58,224	$93,158
		75	12	18	249	240	$59,856	$95,770
		565	12	18	275	240	$66,096	$105,754
		877	12	18	300	240	$72,024	$115,238
		116	12	18	314	240	$75,240	$120,384
EWWCSCIP-2	Highway 41 and El Camino Real Sewer Improvements	511 LF 8" Gravity Sewer 1,216 LF 10" Gravity Sewer 1,774 LF 15" Gravity Sewer	Peak Flows in Existing Sewers Exceed Capacity of System		511 LF 8" Gravity Sewer 1,216 LF 10" Gravity Sewer 2,141 LF 18" Gravity Sewer		$811,086	**$1,297,738**
		1674	8	10	144	175	$25,113	$40,180
		2661	10	12	385	195	$75,134	$120,214
		1446	10	12	84	195	$16,283	$26,052
		2620	10	12	369	195	$71,994	$115,190
		2641	10	12	378	195	$73,652	$117,842
		1396	15	18	65	240	$15,624	$24,998
		1448	15	18	84	240	$20,208	$32,333
		1495	15	18	99	240	$23,856	$38,170
		1787	15	18	171	240	$40,992	$65,587
		2082	15	18	240	240	$57,552	$92,083
		2176	15	18	259	240	$62,208	$99,533
		2598	15	18	362	240	$86,976	$139,162
		2612	8	18	368	240	$88,272	$141,235
		2749	15	18	493	240	$118,224	$189,158
		Traffic Control					$25,000	$40,000
		Caltrans Encroachment Permit					$10,000	$16,000
EWWCSCIP-3	Various Locations Sewer Condition Improvements	11126 LF	8	8	11,126	150	$1,668,900	$2,670,240
						Total	**$3,576,023**	**$5,721,636**



MNS ENGINEERS INC

MKN MICHAEL K NUNLEY & ASSOCIATES

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